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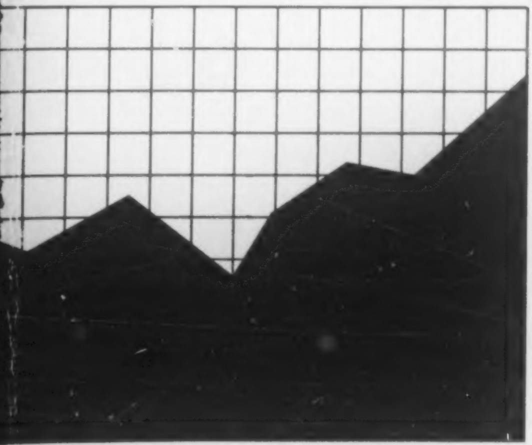
1989-90

The Economic Handbook of The Machine Tool Industry



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NMTBA
The Association For
Manufacturing Technology

1989-1990
Economic Handbook of the Machine Tool Industry

Compiled by the Statistical Department

NMTBA
The Association For
Manufacturing Technology

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McLean, Va. 22102-4269
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$50.00
(NMTBA Members $35.00)

To the '80s, a not-so-fond farewell
To the '90s, a cautiously optimistic welcome

In 1979 the American machine tool industry booked $5.6 billion worth of new orders. In 1989, if projections hold, the figure will be around $3 billion. In between bookings fell as low as $1.5 billion.

Not many people in our industry would object if we wrote it off as the Dismal Decade and let it go at that. After all, just about everything that could go wrong, did. There's no point in reciting again that sad litany of misfortunes: We know them all too well.

Just say this for the '80s: It taught us to think globally. Consider this—in the decade just ending, U.S. consumption of machine tools declined and U.S. builders' *share* of that consumption also declined. The American pie got smaller, and our piece of it got smaller. More than half the machine tools being installed in U.S. plants are imports. The value of these imports more than doubled in ten years. *But in those same ten years world machine tool production leaped from $26 billion to $38 billion!*

The future of the U.S. machine tool industry lies beyond our shores, but not beyond our grasp. We enter the '90s with a leaner—and I hope meaner—industry. Meaner in the sense of lessons learned, of new realities grasped, of competitiveness sharpened.

We enter the '90s with a new emphasis on research and product development.

We enter the '90s with a new concept of quality—one that emphasizes continuous improvement throughout every aspect of a company's operations.

And we enter the '90s with a new view of our industry's scope—a view that is reflected in the change of NMTBA's scope from the National Machine Tool Builders' Association to NMTBA—The Association For Manufacturing Technology.

The '90s have the potential for being even more tumultuous than the '80s. But they will also provide opportunities for companies willing to make the necessary commitment.

For the machine tool industry, opportunities abound.

Albert W. Moore
President

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NATIONAL ECONOMY AND MACHINE TOOLS

Man is a tool-making animal. Since the beginning of history man has used his tools to make even better tools. The culmination of these efforts are today's modern machine tools. These are the machines that form the basis of much of our modern civilization.

A machine tool is a power-driven machine, not hand held, that is used to cut, form, or shape metal. Few, if any, products and services of an industrialized country would exist were it not for machine tools. There would be no trains, no ships, no planes, no cars. There would be no power plants, no electric lights, no refrigerators, or other electrical appliances. And, without agricultural machines, without modern transportation, and without refrigeration—all dependent on modern machine tools—there would be no way to feed the more than 240 million people in this country.

Yet, such is the efficiency and longevity of the products of the machine tool industry that its present production has always represented only a small part of the nation's total output. The entire U.S. machine tool industry is smaller than many individual corporations. Even the limited data available for the first years of this century show, for instance, that metal cutting machine tools shipments made up only slightly more than 10 cents of every $100 in goods and services produced. In 1987, shipments of complete machine tools made up just under 5 cents of every $100 of Gross National Product.

Comparisons of machine tool consumption with capital expenditures by durable goods manufacturing industries show that machine tools make up a comparatively small but significant part of total expenditures for plant, machinery, and other equipment.

Machine tools are typically installed as capital equipment in metalworking industries. The data on machine tools installed in U.S. plants (see Chapter 9) and data collected by NMTBA indicate that the major users of machine tools are the metalworking industries: fabricated metal products, machinery, and transportation equipment (among the latter, primarily the automobile and aerospace industries). Thus, this chapter focuses on private investment, on expenditures for new plant and equipment, and on the orders and shipments of the metalworking industries. Business activity in these industries is likely to affect their capital expenditures and, in turn, to affect the orders that flow to the machine tool industry. However, many other factors also seem to affect the ordering of new machine tools.

The machine tool industry is highly sensitive to the treatment of corporate capital consumption allowances such as investment tax credits and depreciation. Changes in these affect the willingness and ability of the industry's customers to make machine tool purchases. The work of many students of the machine tool industry has indicated that corporate profitability, financial conditions, and the general level of business confidence are also important determinants of machine tool order activity.

Capacity utilization is recognized as another significant determinant of future business investment in plant equipment and thus in machine tools. While attempts to measure the utilization in a broad spectrum of industries are fairly recent, there are several existing series on capacity utilization in manufacturing.

Currently, there is much concern in the United States about the erosion of our capital stock. For instance, studies have shown that the average age of the machine tool population in this country has gone up significantly since the 1950s. Investment apparently has not kept up with the need to replace aging capital assets in U.S. metalworking industries. Several tables showing the stock of capital assets in various machine tool consuming industries are in this chapter. Of particular interest are the tables relating purchases and depreciation of capital goods in manufacturing industries, and the tables of business capital appropriations in current and constant dollars.

Many figures shown in this chapter are in current dollars . . . dollars not adjusted for changes in purchasing power. Overall changes in the purchasing power of the dollar, as measured by producer or consumer prices indexes, provide a measure of the erosion of its value. To measure the impact of price increases, several indexes and "price deflators" to generate "constant dollar" figures are available. These include indexes of producer prices for metal cutting and metal forming machine tools. However, because these indexes are limited in their ability to make adjustments for changes in the qualitative characteristics of machine tools, they should be used with caution.

U.S. machine tool builders have traditionally been active exporters of their products. Until 1978, the U.S. machine tool balance of trade had continuously been positive and had helped offset trade deficits incurred in other sectors. However, a surge in imports in the late 1970s, sparked by unprecedented peacetime machine tool demand, led to the development of a sizable balance of trade deficit. What is troubling is that the competitive impact of machine tool imports is understated in current statistics. The value data for imports exclude important cost elements such as insurance and ocean freight which also affect the balance of payments. These shortcomings of the foreign trade statistics are discussed in Chapter 5, as are other detailed aspects of machine tool foreign trade.

To protect and expand foreign markets many U.S. businesses have established plants in foreign countries. Direct foreign investment increased rapidly during the 1960's and 1970's and U.S. machine tool builders joined this move. While no information is available on machine tool direct foreign investment, data are presented for U.S. direct foreign investments in various countries by all industries and by manufacturing industries.

Definitions and discussions of the terms used in this and other chapters are in the glossary at the end of this book.

THE NATIONAL ECONOMY AND MACHINE TOOLS
1959 to Date

Year	GNP Billion $	Shipments in Billion Dollars: All Manufacturing Industries	Shipments in Billion Dollars: Durable Goods Industry	Shipments in Billion Dollars: Nonelectrical Machinery Industry	Shipments in Million Dollars: Machine Tool Industry	Shipments in Million Dollars: Macine Tool Products	Shipments in Million Dollars: Complete Machine Tools
1959	$ 495.8	$ 363.4	$ 187.3	$ 26.6	$1,112	$ 975	$ 616
1960	515.3	370.5	190.6	26.8	1,266	1,126	744
1961	533.8	371.1	187.4	26.6	1,242	1,102	751
1962	574.6	400.3	207.1	29.2	1,430	1,223	821
1963	606.9	420.7	219.4	31.0	1,502	1,370	898
1964	649.8	448.0	235.6	35.3	1,791	1,650	1,164
1965	705.1	491.9	266.7	39.5	2,107	1,955	1,426
1966	772.0	538.4	295.8	46.9	2,554	2,319	1,685
1967	816.4	557.8	303.2	49.2	2,841	2,585	1,806
1968	892.7	603.2	332.4	51.0	2,817	2,500	1,727
1969	963.9	642.5	353.7	56.1	2,835	2,507	1,598
1970	1,015.5	634.0	338.6	56.5	2,598	2,278	1,443
1971	1,102.7	671.1	359.7	56.0	2,019	1,698	908
1972	1,212.8	756.3	408.3	65.8	2,112	1,929	1,019
1973	1,359.3	875.2	476.2	77.8	2,777	2,596	1,501
1974	1,472.8	1,017.5	530.7	92.5	3,580	3,189	2,031
1975	1,598.4	1,039.1	523.9	95.8	3,834	3,432	2,452
1976	1,782.8	1,185.6	608.3	105.5	3,567	3,197	2,060
1977	1,990.5	1,358.4	711.2	122.2	3,943	3,675	2,281
1978	2,249.7	1,522.9	814.2	143.2	4,978	4,735	3,013
1979	2,508.2	1,727.2	912.7	166.5	6,053	5,762	3,877
1980	2,732.0	1,852.7	930.6	180.7	6,981	6,702	4,692
1981	3,052.6	2,017.5	1,006.5	201.5	7,481	7,206	5,096
1982	3,166.0	1,960.2	952.2	187.9	5,840	5,539	3,604
1983	3,405.7	2,054.9	1,019.5	179.0	4,023	3,664	1,845
1984(r)	3,772.2	2,274.9	1,182.0	210.2	4,520	4,178	2,296
1985(r)	4,014.9	2,341.2	1,243.8	212.6	4,790	4,353	2,545
1986(r)	4,240.3	2,273.3	1,201.7	205.8	4,964	4,369	2,579
1987(r)	4,526.7	2,390.0	1,263.5	216.6	4,658	4,042	2,324
1988(p)	4,864.3	2,610.9	1,387.8	246.8	NA	NA	2,399

NA - Not Available. p - Preliminary. r - Revised.

Sources: Col. 1: U.S. Department of Commerce, "National Income and Product Account (NIPA) Table 1.1" from the July 1988 "Survey of Current Business". Cols. 2, 3 and 4: U.S, Bureau of the Census. "Manufacturers' Shipments, Inventories and Orders: 1982-1986" (revised) and Series M3-1 (monthly). Cols. 5 and 6: U.S. Bureau of the Census, "Annual Survey of Manufacturers," M (AS)-1 & 2 and 1982 "Census of Manufacturers". Col. 7: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments, and Backlog" (monthly).

The last three columns cover the following three different entities.

Machine Tool Industry: (Standard Industrial Classifications 3541 and 3542). All shipments originating in establishments whose primary products are machine tools. The figures include other-than-machine tools produced in these establishments as well as miscellaneous receipts.

Machine Tool Products: All machine tool products shipped by the machine tool industry and by other industries. Excludes all shipments of items which are not classified as machine tool products.

Complete Machine Tools: Shipments of complete machine tools, with values greater than $2,500 per unit including all accessories, attachments, and numerical controls that are ordered and shipped with the machines, as reported by NMTBA.

THE NATIONAL ECONOMY AND MACHINE TOOLS

Indexes, 1959 to Date

1982 = 100

Year	GNP	All Manufacturing Industries	Durable Goods Industry	Nonelectrical Machinery Industry	Machine Tool Industry (a)	Machine Tool Products (a)	Complete Machine Tools (a)
1959	15.7	18.5	19.7	14.2	19.0	17.6	17.1
1960	16.3	18.9	20.0	14.3	21.7	20.3	20.6
1961	16.9	18.9	19.7	14.2	21.3	19.9	20.8
1962	18.1	20.4	21.7	15.5	24.5	22.1	22.8
1963	19.2	21.5	23.0	16.5	25.7	24.7	24.9
1964	20.5	22.9	24.7	18.8	30.7	29.8	32.3
1965	22.3	25.1	28.0	21.0	36.1	35.3	39.6
1966	24.4	27.5	31.1	25.0	43.7	41.9	46.8
1967	25.8	28.5	31.8	26.2	48.6	46.7	50.1
1968	28.2	30.8	34.9	27.1	48.2	45.1	47.9
1969	30.4	32.8	37.1	29.9	48.5	45.3	44.3
1970	32.1	32.3	35.6	30.1	44.5	41.1	40.0
1971	34.8	34.2	37.8	29.8	34.6	30.7	27.7
1972	38.3	38.6	42.9	35.0	36.2	34.8	28.3
1973	42.9	44.6	50.0	41.4	47.6	46.9	41.6
1974	46.5	51.9	56.7	49.2	61.3	57.6	56.4
1975	50.5	53.0	55.0	51.0	65.7	62.0	68.0
1976	56.3	60.5	63.9	56.1	61.1	57.7	57.2
1977	62.9	69.3	74.7	66.0	67.5	66.3	63.3
1978	71.1	77.7	85.5	76.2	85.2	85.5	83.6
1979	79.2	88.1	95.9	88.6	103.6	104.0	107.6
1980	86.3	94.5	97.7	96.2	119.5	121.0	130.2
1981	96.4	102.9	105.7	107.2	128.1	130.1	141.4
1982	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	107.6	104.8	107.1	95.3	68.9	66.1	51.2
1984(r)	119.1	116.0	124.1	111.9	77.4	75.4	63.4
1985(r)	126.8	119.4	130.6	113.1	82.0	78.6	70.6
1986(r)	133.9	116.0	126.2	109.5	85.0	78.9	71.6
1987(r)	143.0	121.9	132.7	115.3	79.8	73.0	64.5
1988(p)	153.6	133.2	145.7	131.3	NA	NA	66.6

NA - Not Available. p - Preliminary. r - Revised.

(a) See notes on page 4.

Sources: U.S. Department of Commerce, U.S. Bureau of the Census, and NMTBA.

GROSS NATIONAL PRODUCT AND COMPONENTS
1969 to Date

Year	Gross National Product	Personal Consumption Expenditures	Gross Private Domestic Investment	Net Exports of Goods and Services	Government Purchases of Goods and Services
In current dollars (billions)					
1969	963.9	597.9	153.2	5.6	207.3
1970	1,015.5	640.0	148.8	8.5	218.2
1971	1,102.7	691.6	172.5	6.3	232.4
1972	1,212.8	757.6	202.0	3.2	250.0
1973	1,359.3	837.2	238.8	16.8	266.5
1974	1,472.8	916.5	240.8	16.3	299.1
1975	1,598.4	1,012.8	219.6	31.1	335.0
1976	1,782.8	1,129.3	277.7	18.8	356.9
1977	1,990.5	1,257.2	344.1	1.9	387.3
1978	2,249.7	1,403.5	416.8	4.1	425.2
1979	2,508.2	1,566.8	454.8	18.8	467.8
1980	2,732.0	1,732.6	437.0	32.1	530.3
1981	3,052.6	1,915.1	515.5	33.9	588.1
1982	3,166.0	2,050.7	447.3	26.3	641.7
1983	3,405.7	2,234.5	502.3	–6.1	675.0
1984	3,772.2	2,430.5	664.8	–58.9	735.9
1985(r)	4,014.9	2,629.0	643.1	–78.0	820.8
1986(r)	4,240.3	2,807.5	665.9	–104.4	871.2
1987(r)	4,526.7	3,012.1	712.9	–123.0	924.7
1988(p)	4,864.3	3,227.5	766.5	–94.6	964.9
In constant 1982 dollars (billions)					
1969	2,423.3	1,456.7	410.3	–34.9	591.2
1970	2,416.2	1,492.0	381.5	–30.0	572.6
1971	2,484.8	1,538.8	419.3	–39.8	566.5
1972	2,608.5	1,621.9	465.4	–49.4	570.7
1973	2,744.1	1,689.6	520.8	3.5	565.3
1974	2,729.3	1,674.0	481.3	0.0	573.2
1975	2,695.0	1,711.9	383.3	18.9	580.9
1976	2,826.7	1,803.9	453.5	–11.0	580.3
1977	2,958.6	1,883.8	521.3	–35.5	589.1
1978	3,115.2	1,961.0	576.9	–26.8	604.1
1979	3,192.4	2,004.4	575.2	3.6	609.1
1980	3,187.1	2,000.4	509.3	57.0	620.5
1981	3,248.8	2,024.2	545.5	49.4	629.7
1982	3,166.0	2,050.7	447.3	26.3	641.7
1983	3,279.1	2,146.0	504.0	–19.9	649.0
1984	3,501.4	2,249.3	658.4	–84.0	677.7
1985(r)	3,618.7	2,354.8	637.0	–104.3	731.2
1986(r)	3,721.7	2,455.2	643.5	–137.5	760.5
1987(r)	3,847.0	2,521.0	674.8	–128.9	780.2
1988(p)	3,996.1	2,592.2	721.8	–100.2	782.3

p - Preliminary. *r* - Revised.

Note: Individual components may not add to total GNP due to rounding.

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Tables 1.1 and 1.2.

ACTUAL AND PROJECTED GNP AND OTHER ECONOMIC INDICATORS

	Measure	Actual 1986(r)	Actual 1987(r)	Actual 1988(p)	Projection 1989
Gross National Product	Bil. $	4,240.3	4,526.7	4,864.3	5,207.0
GNP in Constant Dollars	Bil. 1982 $	3,721.7	3,847.0	3,996.1	4,103.2
GNP Implicit Price Deflator	1982 = 100	113.9	117.7	121.7	126.9
Industrial Production	1977 = 100	125.1	129.8	137.2	142.0
Unemployment Rate	Percent%	7.0%	6.2%	6.2%	5.5%
Corporate Profits After Taxes	Bil. $	192.3	176.6	182.6	175.5
Non-Residential Fixed Investment	Bil. 1982 $	433.1	445.1	487.5	518.0
Change in Business Inventories	Bil. 1982 $	6.6	30.2	16.0	32.2
Personal Consumption Expenditures	Bil. 1982 $	2,455.2	2,521.0	2,592.2	2,652.0
Federal Government Purchases	Bil. 1982 $	333.4	339.0	328.7	332.0

p - Preliminary. r - Revised.

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Tables 1.1, 1.2, 7.5; *Economic Report of the President, 1989;* Projected: American Statistical Association and National Bureau of Economic Research panel of forecasters, "Economic Outlook USA."

SELECTED PRICE DEFLATORS
1969 to Date

Year	Price Deflators: Gross National Product	Personal Consumption Expenditure	Producers' Durable Equipment	Metalworking Machinery & Equipment
	1982 = 100			
1969	39.8	41.0	41.5	33.6
1970	42.0	42.9	43.2	35.6
1971	44.4	44.9	45.5	36.6
1972	46.5	46.7	46.8	37.5
1973	49.5	49.6	47.3	39.1
1974	54.0	54.8	51.1	45.8
1975	59.3	59.2	59.7	53.5
1976	63.1	62.6	64.4	56.9
1977	67.3	66.7	68.3	61.9
1978	72.2	71.6	73.3	67.6
1979	78.6	78.2	78.6	75.2
1980	85.7	86.6	86.0	85.5
1981	94.0	94.6	93.7	93.9
1982	100.0	100.0	100.0	100.0
1983	103.9	104.1	99.5	101.7
1984	107.7	108.1	97.7	104.1
1985(r)	110.9	111.6	96.0	106.5
1986(r)	113.9	114.3	93.6	108.4
1987(r)	117.7	119.5	92.7	110.1
1988(p)	121.7	121.5	92.0	113.5

p - Preliminary. r - Revised.

Note: Gross National Product, Personal Consumption Expenditures and Producers' Durable Equipment values are "Implicit Price Deflators;" Metalworking Machinery and Equipment values are "Producer Price Indices."

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Table 7.4.
U.S. Department of Labor, Bureau of Labor Statistics.

Price deflators are used to express changes over a period of time in constant dollars. The implicit price deflator for GNP is a weighted average of the price indexes used to deflate the components of GNP. It is generally regarded as the best single measure of broad price movements in the economy as a whole.

GROSS NATIONAL PRODUCT AND GOVERNMENT RECEIPTS
Selected Years, 1945 to Date
(Values in Billions of Dollars)

Year	GNP	Total Gov't Receipts	Percent of GNP	Federal Gov't Receipts	Percent of GNP	State & Local Gov't Receipts	Percent of GNP
1945	$ 213.4	$ 53.4	25.0%	$ 42.7	20.0%	$ 11.6	5.4%
1950	288.3	69.4	24.1	50.4	17.5	21.3	7.4
1955	405.9	101.6	25.0	73.1	18.0	31.7	7.8
1960	515.3	140.4	27.2	96.9	18.8	50.0	9.7
1965	705.1	190.2	27.0	125.8	17.8	75.5	10.7
1970	1,015.5	306.8	30.2	195.4	19.2	135.8	13.4
1975	1,598.4	480.0	30.0	294.9	18.4	239.6	15.0
1977	1,990.5	616.6	31.0	384.1	19.3	300.1	15.1
1978	2,249.7	694.4	30.9	441.4	19.6	330.3	14.7
1979	2,508.2	779.8	31.1	505.0	20.1	355.3	14.2
1980	2,732.0	855.1	31.3	553.8	20.3	390.0	14.3
1981	3,052.6	977.2	32.0	639.5	20.9	425.6	13.9
1982	3,166.0	1,000.8	31.6	635.3	20.1	449.4	14.2
1983	3,405.7	1,061.3	31.2	659.9	19.4	487.7	14.3
1984	3,772.2	1,172.9	31.1	726.0	19.2	540.5	14.3
1985(r)	4,014.9	1,270.8	31.7	788.7	19.6	581.8	14.5
1986(r)	4,240.3	1,344.6	31.7	828.3	19.5	623.0	14.7
1987(r)	4,526.7	1,469.5	32.5	916.5	20.2	655.7	14.5
1988(p)	4,864.3	1,566.7	32.2	975.2	20.0	703.0	14.5

p - Preliminary. r - Revised.

Note: Federal grants-in-aid to State and local governments are reflected in State and local receipts. Total government receipts have been adjusted to eliminate this duplication.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Tables 1.1, 3.1, 3.2, and 3.3.

CORPORATE PROFITS AND TAX
Selected Years, 1945 to Date
(Billions of Dollars)

Year	Corporate Profits Before Taxes	Profits Tax Liability	Profits After Tax	Net Dividend Payments	Undistributed Profits
1945	$ 19.8	$ 10.7	$ 9.1	$ 4.6	$ 4.5
1950	42.9	17.9	25.0	8.8	16.2
1955	49.2	22.0	27.2	10.3	16.9
1960	49.9	22.7	27.2	12.9	14.3
1965	77.4	30.9	46.5	19.1	27.4
1970	76.0	34.4	41.7	22.5	19.2
1975	134.8	50.9	83.9	29.6	54.3
1977	194.7	72.7	122.0	40.8	81.2
1978	229.1	82.2	145.9	47.0	98.9
1979	252.7	87.6	165.1	52.7	112.4
1980	234.6	84.8	149.8	58.6	91.2
1981	221.2	81.1	140.0	66.5	73.5
1982	169.5	63.1	106.5	66.9	39.6
1983	207.6	77.2	130.4	71.5	58.9
1984	240.0	93.9	146.1	79.0	67.0
1985(r)	224.3	96.4	127.8	83.3	44.6
1986(r)	236.4	106.6	129.8	88.2	41.6
1987(r)	276.7	133.8	142.9	95.5	47.4
1988(p)	306.4	142.6	163.8	104.5	59.2

p - Preliminary. r - Revised.

Note: Individual items may not add to totals due to rounding.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Table 1.14.

THE FEDERAL BUDGET

Fiscal Years, 1931 to Date

(Billions of Dollars)

Year	Receipts	Outlay	Surplus or Deficit (–)	Year	Receipts	Outlay	Surplus or Deficit (–)
1931	$ 3.1	$ 3.6	$ –0.5	1965	$ 116.8	$ 118.2	$ –1.4
1932	1.9	4.7	–2.7	1966	130.8	134.5	–3.7
1933	2.0	4.6	–2.6	1967	148.8	157.5	–8.6
1934	3.0	6.6	–3.6	1968	153.0	178.1	–25.2
1935	3.7	6.5	–2.8	1969	186.9	183.6	3.2
1936	4.0	8.4	–4.4	1970	192.8	195.6	–2.8
1937	5.0	7.7	–2.8	1971	187.1	210.2	–23.0
1938	5.6	6.8	–1.2	1972	207.3	230.7	–23.4
1939	6.3	9.1	–2.8	1973	230.8	245.7	–14.9
1940	6.5	9.5	–2.9	1974	263.2	269.4	–6.1
1941	8.7	13.7	–4.9	1975	279.1	332.3	–53.2
1942	14.6	35.1	–20.5	1976	298.1	371.8	–73.7
1943	24.0	78.6	–54.6	Tr. Qtr.	81.2	96.0	–14.7
1944	43.7	91.3	–47.6	1977	355.6	409.2	–53.6
1945	45.2	92.7	–47.6	1978	399.6	458.7	–59.2
1946	39.3	55.2	–15.9	1979	463.3	503.5	–40.2
1947	38.5	34.5	4.0	1980	517.1	590.9	–73.8
1948	41.6	29.8	11.8	1981	599.3	678.2	–78.9
1949	39.4	38.8	0.6	1982	617.8	745.7	–127.9
1950	39.4	42.6	–3.1	1983	600.6	808.3	–207.8
1951	51.6	45.5	6.1	1984	666.5	851.8	–185.3
1952	66.2	67.7	–1.5	1985	734.1	946.3	–212.3
1953	69.6	76.1	–6.5	1986	769.1	990.3	–221.2
1954	69.7	70.9	–1.2	1987(r)	854.1	1,003.8	–149.7
1955	65.5	68.4	–3.0	1988(r)	909.0	1,064.0	–155.1
1956	74.6	70.6	3.9	1989E	975.5	1,137.0	–161.5
1957	80.0	76.6	3.4	1990E	1,059.3	1,151.8	–92.5
1958	79.6	82.4	–2.8				
1959	79.2	92.1	–12.8				
1960	92.5	92.2	0.3				
1961	94.4	97.7	–3.3				
1962	99.7	106.8	–7.1				
1963	106.6	111.3	–4.8				
1964	112.6	118.5	–5.9				

E - Estimate. r - Revised.

Tr. Qtr.-Transition Quarter: Beginning with the 1977 Federal Budget, the fiscal year runs from October 1 through September 30. To facilitate the conversion, a three-month transition period was provided between fiscal years 1976 and 1977.

Note: 1930 to 1939: Administrative Budget; 1940 to 1953: Consolidated Cash Statement; 1954 to Date: Unified Budget.

Source: "Economic Report of the President," January 1989 and earlier editions.

GROSS NATIONAL PRODUCT AND PRIVATE INVESTMENT

1959 to Date

(Values in Billions of Current Dollars)

Year	Gross National Product Billion $	Gross Private Fixed Nonresidential Domestic Investment			
		Total		Producers' Durable Equipment	
		Billion $	% of GNP	Billion $	% of GNP
1959	$ 495.8	$ 46.3	9.3%	$ 28.3	5.7%
1960	515.3	48.8	9.5	29.7	5.8
1961	533.8	48.3	9.0	28.9	5.4
1962	574.6	52.5	9.1	32.1	5.6
1963	606.9	55.2	9.1	34.4	5.7
1964	649.8	61.4	9.4	38.7	6.0
1965	705.1	73.1	10.4	45.8	6.5
1966	772.0	83.5	10.8	53.0	6.9
1967	816.4	84.4	10.3	53.7	6.6
1968	892.7	91.4	10.2	58.5	6.6
1969	963.9	102.3	10.6	65.2	6.8
1970	1,015.5	105.2	10.4	66.1	6.5
1971	1,102.7	109.6	9.9	68.7	6.2
1972	1,212.8	123.0	10.1	78.5	6.5
1973	1,359.3	145.9	10.7	94.5	7.0
1974	1,472.8	160.6	10.9	103.6	7.0
1975	1,598.4	162.9	10.2	106.6	6.7
1976	1,782.8	180.0	10.1	119.9	6.7
1977	1,990.5	214.2	10.8	147.4	7.4
1978	2,249.7	259.0	11.5	178.0	7.9
1979	2,508.2	302.8	12.1	203.3	8.1
1980	2,732.0	322.8	11.8	208.9	7.6
1981	3,052.6	369.2	12.1	230.7	7.6
1982	3,166.0	366.7	11.6	223.4	7.1
1983	3,405.7	356.9	10.5	232.8	6.8
1984	3,772.2	416.0	11.0	274.9	7.3
1985(r)	4,014.9	442.9	11.0	289.7	7.2
1986(r)	4,240.3	433.9	10.2	295.4	7.0
1987(r)	4,526.7	446.8	9.9	307.3	6.8
1988(p)	4,864.3	488.4	10.0	345.6	7.1

p - Preliminary. r - Revised.

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Table 1.1.

Gross private fixed nonresidential domestic investment includes capital expenditures by the domestic business sector for (1) new and replacement construction (e.g., buildings, stores, and warehouses) and (2) producers' durable equipment. Expenditures for producers' durable equipment include the new and replacement purchases of automobiles, trucks, various types of machinery, and other equipment used by the private sector in the production of goods and services.

GROSS NATIONAL PRODUCT AND PRIVATE INVESTMENT

1959 to Date

(Values in Billions of 1982 Dollars)

Year	Gross National Product Billion $	Gross Private Fixed Nonresidential Domestic Investment			
		Total		Producers' Durable Equipment	
		Billion $	% of GNP	Billion $	% of GNP
1959	$1,629.1	$153.6	9.4%	$ 81.7	5.0%
1960	1,665.3	159.4	9.6	83.3	5.0
1961	1,708.7	158.2	9.3	80.5	4.7
1962	1,799.4	170.2	9.5	88.9	4.9
1963	1,873.3	176.6	9.4	95.1	5.1
1964	1,973.3	194.9	9.9	107.0	5.4
1965	2,087.6	227.6	10.9	125.8	6.0
1966	2,208.3	250.4	11.3	142.4	6.4
1967	2,271.4	245.0	10.8	139.6	6.1
1968	2,365.6	254.5	10.8	146.5	6.2
1969	2,423.3	269.7	11.1	156.8	6.5
1970	2,416.2	264.0	10.9	152.9	6.3
1971	2,484.8	258.4	10.4	151.0	6.1
1972	2,608.5	277.0	10.6	167.5	6.4
1973	2,744.1	317.3	11.6	199.6	7.3
1974	2,729.3	317.8	11.6	202.7	7.4
1975	2,695.9	281.2	10.4	178.4	6.6
1976	2,826.7	290.6	10.3	186.2	6.6
1977	2,958.6	324.0	11.0	215.7	7.3
1978	3,115.2	362.1	11.6	242.8	7.8
1979	3,192.4	389.4	12.2	258.8	8.1
1980	3,187.1	379.2	11.9	243.0	7.6
1981	3,248.8	395.2	12.2	246.4	7.6
1982	3,166.0	366.7	11.6	223.4	7.1
1983	3,279.1	361.2	11.0	233.9	7.1
1984	3,501.4	425.2	12.1	281.4	8.0
1985(r)	3,618.7	453.5	12.5	304.0	8.4
1986(r)	3,721.7	433.1	11.6	303.8	8.2
1987(r)	3,847.0	445.1	11.6	319.6	8.3
1988(p)	3,996.1	487.5	12.2	362.4	9.1

p - Preliminary.   r - Revised.

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Table 1.2.

U.S. BALANCE OF TRADE
1969 to Date

Year	All Merchandise Billions of Dollars			Machine Tools and Parts Millions of Dollars		
	Exports	Imports	Net Balance	Exports	Imports	Net Balance
1969	$ 36.4	$ 35.8	$ .6	$ 323.5	$ 182.5	$ 140.9
1970	42.5	39.9	2.6	403.9	158.5	245.4
1971	43.3	45.6	–2.3	351.0	109.6	241.4
1972	49.4	55.8	–6.4	332.1	141.8	190.3
1973	71.4	70.5	0.9	443.0	211.6	231.4
1974	98.3	103.8	–5.5	566.5	330.3	236.2
1975	107.1	98.2	8.9	705.9	382.4	323.5
1976	114.7	124.2	–9.5	682.8	383.3	299.5
1977	120.8	151.9	–31.1	579.6	482.2	97.4
1978	142.1	176.0	–33.9	738.6	832.4	–93.7
1979	184.5	212.0	–27.5	878.6	1,269.5	–390.9
1980	224.3	249.8	–25.5	1,099.2	1,556.9	–457.7
1981	237.1	265.1	–28.0	1,445.6	1,712.9	–267.3
1982	211.2	247.6	–36.4	1,002.4	1,489.4	–487.0
1983	201.8	268.9	–67.1	691.9	1,100.2	–408.3
1984	219.9	332.4	–112.5	734.9	1,652.7	–917.8
1985	215.9	338.1	–122.2	772.2	2,110.2	–1,338.0
1986	224.4	368.7	–144.3	908.1	2,682.9	–1,774.8
1987	254.8(r)	413.0(r)	–158.2(r)	1,010.2	2,412.3	–1,402.1
1988	321.6(p)	449.7(p)	–128.1(p)	1,427.5	2,419.8	–992.3

p - Preliminary. r - Revised.

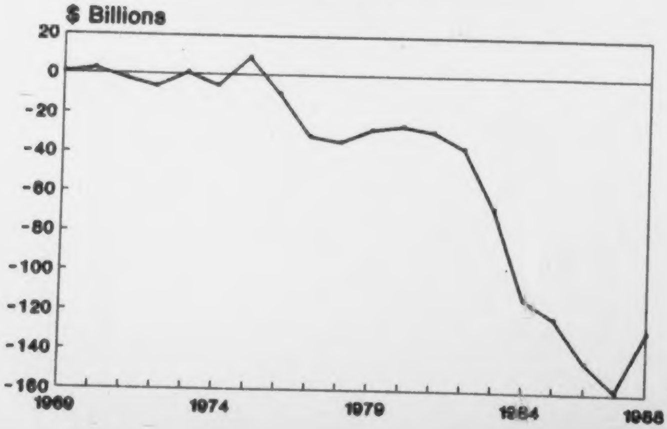
Note: Machine tool export figures include used and rebuilt machine tools, machine tools designed for home workshops and laboratories, and some metal working machinery other than machine tools. Some attachments and accessories are included prior to 1972.

Individual items may not add to totals due to rounding.

Source: All merchandise: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Table 4.3; Machine Tools: U.S. Bureau of the Census, "EM 522" and "IM 146."

For details on how the values in the above table are computed, see the text introduction to Chapter 5.

U.S. Balance of Trade
1969 to Date



VALUE OF U.S. DIRECT FOREIGN INVESTMENTS
Book Value at Year End, 1983 to 1988
(Millions of U.S. Dollars)

	1983	1984	1985	1986	1987(r)	1988(p)
World:						
Total All Industries	$207,203	$211,480	$229,748	$259,890	$307,983	$326,900
Manufacturing	82,907	85,865	95,104	107,241	127,074	133,819
Canada:						
Total All Industries	44,339	46,730	47,106	50,178	58,377	61,244
Manufacturing	19,209	20,986	21,848	23,759	26,782	28,141
European Economic Community(a):						
Total All Industries	70,210	69,500	81,337	99,619	120,066	126,502
Manufacturing	34,525	34,379	41,934	52,034	64,659	65,431
United Kingdom:						
Total All Industries	27,637	28,553	32,801	34,990	42,031	47,991
Manufacturing	10,920	10,512	12,777	13,990	17,668	18,867
Other Western Europe:						
Total All Industries	21,966	22,089	24,034	23,564	26,177	25,730
Manufacturing	3,413	3,254	3,761	2,032	2,765	2,499
Japan:						
Total All Industries	7,661	7,936	9,246	11,333	14,671	16,868
Manufacturing	3,915	4,076	4,593	5,305	7,136	7,876
Australia, New Zealand, & South Africa:						
Total All Industries	11,558	10,868	10,146	10,015	13,399	15,154
Manufacturing	4,284	4,256	3,770	3,972	4,262	4,903
Latin America and Other Western Hemisphere:						
Total All Industries	24,133	24,627	27,901	34,970	44,905	49,283
Manufacturing	13,995	14,566	14,760	15,193	15,768	17,850
Other Areas:						
Total All Industries	27,334	29,730	29,977	30,210	30,388	32,119
Manufacturing	3,565	4,350	4,437	4,887	5,702	7,119

p - Preliminary. r - Revised.

(a) Beginning in 1986, Portugal and Spain are included in the European Economic Community.

Direct foreign investments include purchases and sales of equity interest in foreign enterprises and capital movements between U.S. corporations and their foreign affiliates.

Source: U.S. Department of Commerce, "Survey of Current Business," (June).

ESTIMATES OF CAPITAL EXPENDITURES* BY MAJORITY-OWNED FOREIGN AFFILIATES OF U.S. COMPANIES BY SELECTED COUNTRY OR AREA, 1982–1989

(Millions of U.S. Dollars)

	Actual						Projection	
	1982	1983	1984	1985	1986	1987(r)	1988(r)	1989
WORLD								
Total Manufacturing	$16,755	$13,724	$14,048	$14,923	$16,392	$17,162	$20,848	$24,473
Mchy., Except Elec.	4,900	3,778	3,206	3,016	2,858	2,974	3,355	4,293
CANADA								
Total Manufacturing	2,740	2,590	2,702	2,926	3,322	3,000	3,622	4,018
Mchy., Except Elec.	601	413	295	223	218	241	338	386
LATIN AMERICA								
Total Manufacturing	2,703	1,744	1,909	2,026	2,027	2,060	2,359	3,055
Mchy., Except Elec.	369	227	319	356	270	272	321	415
EUROPE								
Total Manufacturing	9,274	7,824	7,619	7,900	8,897	9,797	11,613	13,482
Mchy., Except Elec.	3,249	2,844	2,247	1,837	1,939	1,984	2,156	2,392
UNITED KINGDOM								
Total Manufacturing	2,529	2,113	2,107	2,213	2,154	2,581	3,165	3,737
Mchy., Except Elec.	635	600	465	454	400	349	444	584
FRANCE								
Total Manufacturing	1,323	1,241	1,232	1,010	1,296	1,539	1,567	1,799
Mchy., Except Elec.	868	798	746	469	583	573	528	534
FEDERAL REP. OF GERMANY								
Total Manufacturing	2,306	2,180	2,163	2,371	2,738	2,350	3,087	3,310
Mchy., Except Elec.	894	723	577	450	521	545	659	650
ITALY								
Total Manufacturing	696	639	504	595	602	726	806	930
Mchy., Except Elec.	D	350	208	209	183	D	168	215
ASIA AND PACIFIC								
Total Manufacturing	1,327	1,004	1,265	1,358	1,277	1,360	2,295	2,927
Mchy., Except Elec.	57(a)	58(a)	317	74(a)	61(a)	74(a)	117(a)	133(a)
JAPAN								
Total Manufacturing	765	463	551	744	704	711	1,209	1,707
Mchy., Except Elec.	D	D	258	D	D	D	D	D
SOUTH AFRICA								
Total Manufacturing	211	174	137	90	45	34	37	57
Mchy., Except Elec.	18	14	12	10	D	4	4	4
AUSTRALIA								
Total Manufacturing	424	323	364	556	613	757	775	794
Mchy., Except Elec.	29	12	14	19	18	D	D	D

D - Withheld to avoid disclosure. r - Revised.

(a) Excludes Japan.

* – "Capital expenditures" previously were referred to as "property, plant, and equipment expenditures." They represent gross outlays charged to capital accounts to acquire, add to, or improve real property, plant, and equipment. Sales or other dispositions of fixed assets are not netted against these outlays.

Source: U.S. Department of Commerce, "Survey of Current Business" (March).

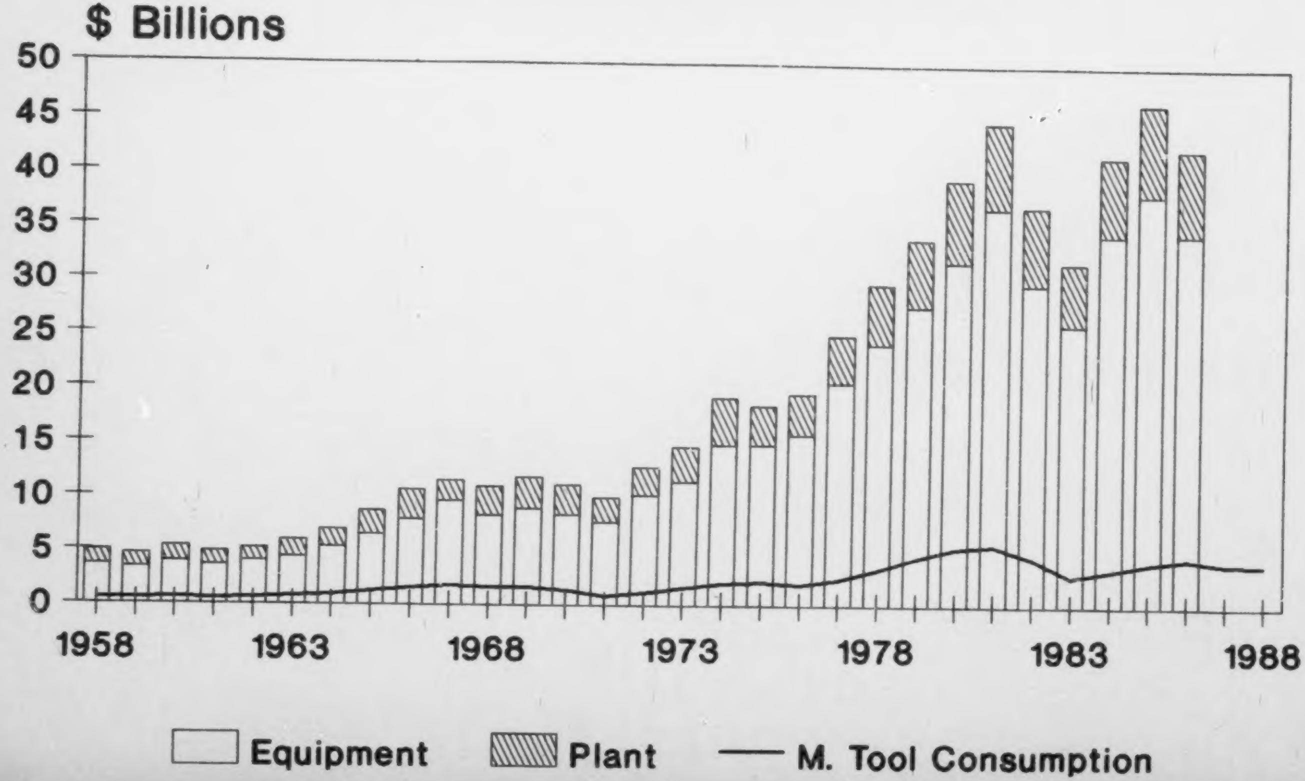
EXPENDITURES ON NEW PLANT AND EQUIPMENT
Major Industries, Selected Years, 1960 to Date
(Billions of Dollars)

Year	All Industries	Total Manufacturing Industries	Durable Goods Industries	Electrical Machinery and Equipment	Non-electrical Machinery	Motor Vehicles and Parts	Other Transportation Equipment
1960	$ 39.44	$ 16.36	$ 8.28	$ 1.02	$ 1.21	$ 1.47	$0.47
1965	59.52	25.41	13.49	1.69	2.24	3.00	0.74
1970	91.91	36.99	19.80	3.49	3.78	3.05	1.60
1971	92.91	33.60	16.78	3.03	3.15	2.42	1.12
1972	103.40	35.42	18.22	2.83	3.23	3.00	1.41
1973	120.03	42.35	22.63	3.48	3.95	3.83	1.77
1974	139.67	52.48	26.77	3.80	5.13	4.29	2.31
1975	142.42	53.66	25.37	3.08	4.86	3.33	2.13
1976	158.44	58.53	27.50	3.61	5.43	3.60	2.19
1977	184.82	67.48	32.77	4.61	6.35	5.82	2.50
1978	217.76	78.58	39.46	5.89	7.42	7.19	3.63
1979	254.96	95.92	48.50	7.55	10.17	8.34	4.71
1980	282.80	112.33	55.36	9.77	11.41	9.02	5.96
1981	315.22	126.54	59.81	10.58	13.68	9.83	5.60
1982	310.58	120.68	55.35	11.01	13.44	7.77	4.79
1983	304.78	116.20	53.08	11.42	13.50	7.29	4.04
1984	354.44	138.82	66.24	14.61	15.41	11.20	4.98
1985	387.13	153.48	73.27	15.47	15.98	14.63	4.83
1986	379.47	142.69	69.14	14.17	13.61	13.95	4.93
1987(r)	389.67	145.90	71.01	15.28	13.85	11.91	4.71
1988(r)	429.67	165.70	78.12	18.29	15.22	10.61	4.75
1989E	472.08	179.35	82.13	18.32	15.07	12.21	5.27

E - Estimate. r - Revised.

Sources: U.S. Department of Commerce, Bureau of the Census.

CAPITAL EXPENDITURES BY DURABLE GOODS INDUSTRIES



EXPENDITURES ON NEW PLANT AND EQUIPMENT BY DURABLE GOODS INDUSTRIES AND MACHINE TOOL CONSUMPTION

1954 to Date

	New Plant & Equipment Expenditures Billion Dollars				U.S. Machine Tool Consumption (c) (Mil. Dollars)	Machine Tool Consumption As a % of		
	BEA (a.r)	Census (b)				BEA (a.r)	Census (b)	
Year	Total	Total	Plant	Equipment		Total	Total	Equipment
1954	$ 4.91	$ 4.32	$1.20	$ 3.12	NA	NA	NA	NA
1955	5.41	4.59	1.28	3.31	NA	NA	NA	NA
1956	7.45	6.62	1.95	4.67	NA	NA	NA	NA
1957	7.84	6.94	2.20	4.74	NA	NA	NA	NA
1958	5.61	4.94	1.33	3.61	$ 554.9	9.9%	11.2%	15.4%
1959	6.73	4.64	1.29	3.35	587.1	8.7	12.7	17.5
1960	8.28	5.34	1.47	3.87	634.0	7.7	11.9	16.4
1961	7.42	4.81	1.21	3.60	544.4	7.3	11.3	15.1
1962	7.81	5.12E	1.17E	3.95E	625.0	8.0	12.2	15.8
1963	8.64	5.92	1.55	4.37	798.3	9.2	13.5	18.3
1964	10.99	6.95	1.64	5.31	967.2	8.8	13.9	18.2
1965	13.49	8.70	2.18	6.52	1,263.5	9.4	14.5	19.4
1966	17.23	10.61E	2.72E	7.89E	1,588.9	9.2	15.0	20.1
1967	17.82	11.52	1.92	9.60	1,780.0	10.0	15.4	18.5
1968	17.93	10.97	2.71	8.26	1,669.8	9.3	15.2	20.2
1969	19.97	11.81	2.90	8.91	1,605.9	8.0	13.6	18.0
1970	19.80	11.11	2.74	8.37	1,391.5	7.0	12.5	16.6
1971	16.78	9.96	2.34	7.62	896.4	5.3	9.0	11.8
1972	18.22	12.70	2.56	10.14	1,145.1	6.3	9.0	11.3
1973	22.63	14.58	3.15	11.43	1,629.4	7.2	11.2	14.3
1974	26.77	19.13	4.26	14.87	2,026.2	7.6	10.6	13.6
1975	25.37	18.42	3.60	14.82	2,187.0	8.6	11.9	14.8
1976	27.50	19.57	3.75	15.82	1,981.6	7.2	10.1	12.5
1977	32.77	24.93	4.41	20.52	2,427.6	7.4	9.7	11.8
1978	39.46	29.66	5.52	24.14	3,324.8	8.4	11.2	13.8
1979	48.50	33.91	6.22	27.69	4,488.7	9.3	13.2	16.2
1980	55.36	39.42	7.62	31.80	5,338.0	9.6	13.5	16.8
1981	59.81	44.75	7.83	36.91	5,593.2	9.3	12.5	15.2
1982	55.35	37.02	7.23	29.80	4,447.4	8.0	12.0	14.9
1983	53.08	31.78	5.80	25.98	2,706.9	5.1	8.5	10.4
1984	66.24	41.74	7.33	34.42	3,371.9	5.1	8.1	9.8
1985	73.27	46.64	8.43	38.21	3,970.4	5.4	8.5	10.4
1986(r)	69.14	42.41	7.86	34.55	4,380.2	6.3	10.4	12.8
1987(r)	71.01	NA	NA	NA	3,964.8	5.6	NA	NA
1988(p)	78.30	NA	NA	NA	3,924.4	5.0	NA	NA

NA - Not Available. E - Estimate. p - Preliminary. r - Revised.

(a) Bureau of Economic Analysis: covers all establishments (Manufacturing and Nonmanufacturing) operated by Manufacturing companies.

(b) Bureau of the Census: covers all Manufacturing establishments.

(c) U.S. domestic machine tool shipments plus imports.

Source: U.S. Department of Commerce, "Survey of Current Business" (April); Bureau of the Census, "Annual Survey of Manufacturers, Expenditures for New Plant and New Equipment"; and NMTBA.

The last three columns in the above table show the percentage of investment for machine tools has declined since the 1960's. The U.S. share of machine tool investment has declined even more because imports have increased their share of the U.S. machine tool market. See the table in the beginning of chapter 5 on machine tool imports as a percentage of U.S. consumption.

EXPENDITURES FOR NEW MACHINERY AND EQUIPMENT

By Major Machine Tool Consuming Industries, 1949 to Date

(Millions of Dollars)

Year	Durable Goods Industries	Fabricated Metal Products	Nonelectrical Machinery	Electrical Machinery	Motor Vehicles & Equipment (a)	Aircraft & Parts
1949	NA	$ 167.8	$ 214.5	$ 133.5	$ 147.9	$ 27.2
1950	NA	223.9	213.0	145.4	216.0	S
1951	NA	246.0	348.5	192.7	290.5	79.7
1952	NA	236.9	342.5	215.9	270.5	77.9
1953	$3,010	288.9	404.1	258.8	406.9	83.4
1954	3,120	323.2	425.5	247.6	621.0	87.8
1955	3,309	335.0	440.6	262.3	484.9	115.7
1956	4,669	361.1	545.3	342.3	854.9	181.4
1957	4,740	398.2	553.6	348.4	581.0	209.7
1958	3,605	316.8	487.0	311.1	271.0	129.2
1959	3,350	357.4	399.6	375.2	310.5	128.3
1960	3,866	360.4	435.1	449.0	371.0	124.4
1961	3,600	314.3	416.6	424.9	319.4	149.7
1962	3,946	390.2	447.8	476.4	366.4	189.4
1963	4,366	460.1	612.1	525.9	510.4	191.8
1964	5,306	549.4	713.3	668.2	712.0	204.6
1965	6,520	612.0	960.3	810.5	889.9	206.3
1966	7,889	725.6	1,157.2	1,019.6	893.9	414.7
1967	9,595	834.2	1,361.5	1,087.9	643.0	546.6
1968	8,256	799.5	1,299.8	1,061.3	632.0	463.8
1969	8,905	951.9	1,449.7	1,239.2	781.2	479.0
1970	8,365	872.0	1,377.3	1,134.6	731.7	292.9
1971	7,619	808.6	1,292.7	1,061.1	620.4	197.5
1972	10,139	1,030.7	1,478.2	1,123.4	1,921.3	139.8
1973	11,432	1,345.4	1,791.2	1,567.9	1,625.3	197.6
1974	14,868	1,470.4	2,456.8	1,899.9	2,087.5	227.6
1975	14,821	1,628.9	2,571.6	1,519.1	1,653.6	286.7
1976	15,822	1,724.8	2,611.1	1,816.5	1,908.1	350.6
1977	20,525	2,280.8	3,502.5	2,360.2	3,195.4	417.5
1978	24,142	2,494.4	4,427.7	2,937.9	3,968.6	575.1
1979	27,689	2,741.6	5,326.0	3,650.3	4,243.4	936.4
1980	31,803	3,219.8	6,086.1	4,780.1	4,752.6	1,262.7
1981	36,912	3,791.8	7,040.1	5,098.1	7,539.0	1,325.4
1982	29,796	2,934.0	6,489.4	5,364.4	3,377.7	1,230.1
1983	25,977	2,316.3	5,447.0	5,826.6	1,991.2	1,107.1
1984	34,416	3,203.4	6,603.9	8,146.8	3,801.7	1,508.1
1985(r)	38,211	3,635.1	6,996.3	8,378.1	5,185.0	1,820.9
1986(p)	34,551	3,860.8	5,630.4	7,181.2	5,408.5	2,069.4

p - Preliminary. r - Revised. NA - Not Available. S - Estimate did not meet publication standards.

(a) Beginning in 1972, expenditures for special automotive tools (such as dies, die sets, jigs, fixtures, etc.) are included as capital expenditures. For transition information, special tooling expenditures amount to $1.2 billion for 1972 and $840 million for 1973.

Source: U.S. Bureau of the Census, "Annual Survey of Manufacturers, Expenditures for New Plant and New Equipment."

CAPITAL FORMATION IN MANUFACTURING INDUSTRIES

Selected Years, 1960 to 1987

(Billions of Dollars)

Year	Purchases		Depreciation (a)		Net Investment (b)		Net Value (c)	
	Total (d)	Equipment	Total (d)	Equipment	Total (d)	Equipment	Total (d)	Equipment
In Current Dollars								
1960	$10.4	$ 7.5	$ 8.4	$ 6.7	$ 2.0	$ .8	$ 94.7	$ 63.3
1965	18.0	12.8	10.4	8.2	7.6	4.6	121.1	78.5
1970	23.8	17.4	16.5	12.7	7.3	4.7	203.8	126.8
1972	25.2	19.4	19.7	14.6	5.5	4.8	233.6	141.3
1973	27.9	21.3	20.7	15.4	7.2	5.9	255.3	153.9
1974	37.4	28.5	23.8	17.8	13.6	10.7	313.5	193.6
1975	38.5	30.5	28.7	22.0	9.8	8.5	351.3	226.3
1976	41.7	33.3	31.9	24.7	9.8	8.6	382.5	248.4
1977	48.0	39.2	35.6	27.6	12.4	11.6	424.9	278.7
1978	58.2	47.2	40.2	31.4	18.0	15.8	493.7	317.9
1979	67.3	52.8	46.6	36.3	20.7	16.5	550.8	363.8
1980	75.3	60.6	53.1	41.8	22.2	18.8	633.9	424.9
1981	81.9	65.4	61.0	48.3	20.9	17.1	713.4	418.7
1982	78.3	61.6	67.2	53.5	11.1	8.1	715.2	513.5
1983	68.4	55.9	70.0	55.5	–1.6	.4	768.0	517.4
1984	82.4	69.1	72.7	57.5	9.7	11.6	797.6	537.1
1985	88.8	73.4	75.7	60.0	13.1	13.4	823.0	558.7
1986	80.2	65.5	77.4	60.9	2.8	4.6	835.4	557.5
1987	82.2	68.6	80.0	62.7	2.2	5.9	859.2	573.5
In 1982 Dollars								
1960	$34.5	$23.6	$27.4	$20.9	$ 7.1	$ 2.7	$321.2	$202.2
1965	56.4	38.4	31.4	23.7	25.0	14.7	382.4	235.8
1970	59.9	42.7	40.8	30.6	19.1	12.1	513.3	314.3
1972	57.1	43.6	45.1	33.4	12.0	10.2	537.7	333.4
1973	61.6	47.7	45.8	34.6	5.8	13.1	554.2	347.2
1974	74.0	57.1	47.6	36.3	6.4	20.8	581.1	368.6
1975	65.1	51.3	49.8	38.1	5.3	13.2	597.2	382.5
1976	66.2	52.1	51.8	39.9	14.4	12.2	612.5	395.5
1977	71.4	57.8	54.1	41.8	17.3	16.0	630.5	412.3
1978	80.2	64.7	56.4	44.0	23.8	20.7	655.1	433.7
1979	85.1	66.7	59.7	46.6	25.4	20.1	681.4	454.8
1980	86.8	69.8	62.0	48.9	26.8	20.9	707.2	476.6
1981	86.2	68.8	64.8	51.4	21.4	17.4	729.7	495.0
1982	77.8	61.0	67.2	53.5	10.6	7.5	741.3	503.6
1983	67.6	55.7	68.9	55.0	–1.3	0.7	741.1	505.3
1984	81.0	68.8	70.7	56.7	10.3	12.1	752.8	518.8
1985	87.1	73.4	73.1	59.0	14.0	14.4	768.3	534.6
1986	78.8	66.2	74.3	60.1	4.5	6.1	763.2	527.8
1987	80.8	69.5	76.2	61.9	4.6	7.6	769.2	536.8

(a) Straight-line depreciation.

(b) Represents the difference between the purchase and depreciation series.

(c) Represents net value in preceding year plus net investment based on straight-line depreciation for year shown.

(d) Total includes equipment and structures.

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Data refer to privately owned manufacturing industries and are based on the fixed capital formation components of the gross national product. Stocks are as of end of year; investment and depreciation are annual totals.

CAPITAL APPROPRIATIONS AND BACKLOG OF UNSPENT APPROPRIATIONS (a)

By Selected Industry Groups, 1969 to Date

	All Manufacturing		Durables		Nonelectrical Machinery	
Year	Approp.	Backlog	Approp.	Backlog	Approp.	Backlog
In Current Dollars (Billions)						
1969	$ 29.5	$ 23.1	$14.9	$12.1	$ 3.1	$1.3
1970	24.4	21.3	12.5	11.5	3.0	1.2
1971	23.9	19.3	11.0	9.8	2.8	1.3
1972	32.4	22.8	14.4	10.6	3.6	1.7
1973	47.7	35.0	22.4	16.0	4.4	2.4
1974	55.4	48.4	26.0	21.6	5.7	3.4
1975	45.4	46.4	16.3	19.9	4.0	3.6
1976	53.0	47.3	22.5	19.8	5.0	4.0
1977	66.4	55.2	26.9	23.3	5.3	4.2
1978	71.3	62.9	33.3	28.2	7.5	5.1
1979	94.1	75.5	42.6*	36.3	9.8*	7.1
1980	103.8	89.7	42.9*	40.9	8.7*	6.6
1981	103.0	94.0	42.1*	40.5	12.6*	8.0
1982	80.0	74.3	31.6*	31.3	8.1*	5.8
1983	94.8	73.8	37.6*	28.0	3.8*	5.5
1984	120.5	93.7	59.9*	40.4	12.8*	6.9
1985	102.3	96.0	51.7*	45.3	9.7*	7.5
1986	83.7	76.3	42.0*	34.3	6.6*	6.7
1987(r)	96.1	78.1	63.4*	35.2	7.2*	5.7
1988	157.2	100.2	78.9*	44.6	NA	NA
In Constant 1982 Dollars (Billions), (r,b)						
1969	$ 74.1	NA	$37.4	NA	$ 7.8	NA
1970	58.1	NA	29.8	NA	7.1	NA
1971	53.8	NA	24.8	NA	6.3	NA
1972	69.7	NA	31.0	NA	7.7	NA
1973	96.4	NA	45.3	NA	8.9	NA
1974	102.6	NA	48.1	NA	10.6	NA
1975	76.6	NA	27.5	NA	6.7	NA
1976	84.0	NA	35.7	NA	7.9	NA
1977	98.7	NA	40.0	NA	7.9	NA
1978	98.8	NA	46.1	NA	10.4	NA
1979	119.7	NA	54.2	NA	12.5	NA
1980	121.1	NA	50.1	NA	10.2	NA
1981	109.6	NA	44.8	NA	13.4	NA
1982	80.0	NA	31.6	NA	8.1	NA
1983	91.2	NA	36.2	NA	8.5	NA
1984	111.9	NA	55.6	NA	11.9	NA
1985	92.0	NA	53.9	NA	8.7	NA
1986	84.2	NA	55.6	NA	6.3	NA
1987	81.8	NA	54.0	NA	6.1	NA
1988	129.2	NA	64.8	NA	NA	NA

r - Revised. NA - Not Available. * - Seasonally adjusted.

(a) These data are the results of The Conference Board's survey of the 1,000 largest U.S. manufacturers and pertain only to their domestic capital investment. This series is copyrighted by The Conference Board and can be reproduced only with their written permission.

(b) Calculated by applying GNP Deflator to Current Dollar totals.

Source: The Conference Board.

GROSS BOOK VALUE OF DEPRECIABLE ASSETS (a)

Selected Industry Groups, 1983 to 1985

(Millions of Dollars)

	1983		1984		1985	
Industry Group	Total	Machinery & Equipment	Total	Machinery & Equipment	Total	Machinery & Equipment
All Operating Manufacturing Establishments	$730,526	$559,622	$771,714	$591,925	$821,221	$631,665
Fabricated Metal Products	41,455	31,476	43,286	33,093	45,671	35,037
Nonelectrical Machinery	70,163	51,893	73,987	55,116	77,401	57,897
Construction & Related Machinery	12,848	9,087	12,200	8,629	11,684	8,258
Metalworking Machinery	7,603	5,834	8,157	6,253	8,619	6,638
Metal Cutting Machine Tools	1,677	1,205	1,638	1,171	1,632	1,172
Metal Forming Machine Tools	639	464	595	430	657	476
Other Metalworking Machinery	5,286	4,165	5,924	4,652	6,330	4,990
Special Industrial Machinery	4,217	2,964	4,643	3,306	4,975	3,572
General Industrial Machinery	9,382	7,012	10,126	7,624	10,534	7,990
Office & Computing Machines	14,055	10,045	15,971	11,595	17,864	13,119
Other Nonelectrical Machinery	22,058	16,951	22,890	17,709	23,725	18,320
Electrical Machinery	51,715	37,293	59,589	43,501	67,116	48,822
Transportation Equipment	61,166	44,511	66,025	48,128	72,796	53,356
Instruments & Related Products	17,313	12,085	19,126	13,403	20,655	14,771

(a) Includes all fixed depreciable assets on the books of establishments at year end. Values represent actual cost of assets at the time they were acquired. Total includes all buildings, structures, machinery and equipment. Machinery and equipment includes production, office and transportation equipment.

Source: U.S. Bureau of the Census, "Annual Survey of Manufacturers."

NOTE: Data for this table was not collected in 1986.

The tables appearing on this and the following page are included to provide some measure of the total stock of fixed assets in selected machine tool consuming industries. However, neither table presents an ideal measurement. Data in the "Gross Book Value" table include the total original cost of assets until the time they are fully depreciated. These are available only on an annual basis. The "Net Value" table is more current and is available on a quarterly basis but includes land, mineral rights, depletion, and amortization.

The data in the tables are not directly comparable due to these definitional differences in sample coverage and statistical methodology. For additional information on the gross book value of depreciable assets in the machine tool industry, see chapter 8.

NET VALUE OF PROPERTY, PLANT AND EQUIPMENT (a)

Selected Industry Groups, 1979 to Date

(Millions of Dollars)

Year: Qtr.	All Manufacturing	Fabricated Metal Products	Nonelectrical Machinery	Electrical Machinery	Transportation Equipment	Instruments and Related Products
1979:1	$393,630	$14,681	$33,204	$19,480	$29,982	$ 8,343
:2	405,188	15,213	34,931	20,048	31,289	8,631
:3	418,836	15,556	36,345	20,925	32,857	8,925
:4	441,415	15,597	39,093	22,222	34,130	9,447
1980:1	455,115	15,871	41,330	22,360	35,514	9,549
:2	468,348	16,309	42,619	23,204	36,913	9,826
:3	487,080	16,569	44,381	24,323	38,312	10,253
:4	515,022	18,607	46,718	26,186	39,861	10,761
1981:1	529,406	18,886	47,618	27,048	41,440	11,101
:2	547,707	19,391	49,446	28,072	42,533	11,491
:3	565,901	19,493	51,334	29,106	43,911	11,837
:4	586,077	19,846	54,078	30,817	44,746	12,425
1982:1	604,415	20,269	55,103	30,912	45,858	12,771
:2	618,376	20,952	56,950	31,808	46,481	13,047
:3	631,131	21,172	58,678	32,913	47,362	13,579
:4	643,348	21,688	59,010	33,407	48,240	13,939
1983:1	648,112	22,380	58,624	33,792	48,033	14,111
:2	653,660	21,964	58,452	33,735	47,702	14,372
:3	658,354	22,172	58,386	34,787	47,700	14,231
:4	663,282	21,464	50,403	35,921	49,406	14,797
1984:1	669,032	21,456	50,889	36,636	48,473	14,941
:2	678,085	21,814	51,033	37,804	49,622	15,164
:3	688,359	22,247	50,761	39,843	50,438	15,505
:4	704,110	23,324	50,967	41,996	50,178	17,040
1985:1	703,569	23,249	51,305	42,107	51,284	18,026
:2	709,226	23,636	52,279	42,757	52,567	18,433
:3	714,467	23,375	52,554	42,273	54,421	18,844
:4	719,861	24,659	52,340	45,754	57,602	19,196
1986:1	731,689	24,921	51,893	44,619	64,241	19,091
:2	730,942	24,944	51,771	42,537	66,312	19,550
:3	733,158	24,980	51,942	43,328	68,572	19,408
:4	729,310	25,371	52,810	42,619	70,457	19,012
1987:1	725,877	25,056	52,512	42,674	70,803	18,206
:2	725,987	25,123	52,676	43,488	70,488	18,092
:3	733,095	24,610	52,179	43,347	70,997	18,208
:4(r)	745,561	24,710	50,664	45,255	70,962	20,368
1988:1	752,421	25,775	51,107	45,039	71,470	21,087
:2	758,742	25,697	51,829	44,821	71,296	21,505
:3	764,271	25,174	52,168	45,583	71,247	22,295
:4(p)	782,401	26,535	53,087	47,850	74,210	23,136

p - Preliminary.   r - Revised.

(a) Depreciable fixed assets including construction in progress, land and mineral rights less accumulated depreciation, depletion and amortization.

Source: Bureau of the Census, "Quarterly Financial Report for Manufacturing Corporations" (Quarterly).

Net Value of Property, Plant and Equipment data are collected quarterly by extensive survey of manufacturing, mining and trade corporations. Each corporation is required to show gross receipts by source industry and is classified in the particular industry which accounts for the largest share of gross receipts. Please note that these procedures may lead to a conglomerate corporation being assigned to an industry from which only a small proportion of its receipts are obtained. For this reason, the above data should be used with caution.

INTEREST RATES CHARGED BY BANKS ON BUSINESS LOANS
Short-term Rates, 1971 to Date
(Percent per Annum)

Year	Average Annual Rate	February	May	August	November
1971	6.48%	6.59%	6.01%	6.51%	6.18%
1972	5.82	5.52	5.59	5.84	6.33
1973	8.30	6.52	7.35	9.24	10.08
1974	11.28	9.91	11.15	12.40	11.64
1975	8.65	9.94	8.16	8.22	8.29
1976	7.52	7.54	7.44	7.80	7.28
1977	7.85	7.48	7.37	7.87	8.66
1978	9.84	8.95	9.01	9.97	11.44
1979	13.18	12.27	12.34	12.31	15.81
1980	15.17	15.67	17.75	11.56	15.70
1981	19.56	19.91	19.99	21.11	17.23
1982	14.69	17.13	17.11	13.27	11.26
1983	10.64	10.20	10.31	11.09	10.95
1984	12.02	11.06	12.45	13.29	11.29
1985	9.74	10.10	9.90	9.27	9.68
1986	8.11	9.29	8.13	7.73	7.28
1987(r)	8.29	7.84	8.66	8.20	8.47
1988	9.18	8.37	8.49	9.75	10.11

r - Revised.

Source: Federal Reserve Board.

INTEREST RATES CHARGED BY BANKS ON BUSINESS LOANS
Long-term Rates, 1971 to Date
(Percent per Annum)

Year	Average Annual Rate	February	May	August	November
1971	6.57%	6.82%	6.36%	6.67%	6.44%
1972	6.12	5.64	5.87	6.31	6.67
1973	8.83	7.12	7.67	9.85	10.68
1974	11.70	10.16	11.41	13.08	12.16
1975	9.06	10.26	8.22	8.89	8.88
1976	7.99	8.02	8.02	8.45	7.48
1977	8.52	9.05	8.24	8.09	8.71
1978	10.11	9.19	9.67	10.20	11.38
1979	12.98	12.01	12.08	12.25	15.56
1980	15.32	15.79	18.37	12.06	15.07
1981	19.52	19.26	19.25	20.62	18.94
1982	15.25	16.59	16.96	15.22	12.24
1983	12.01	11.81	11.46	11.83	12.94
1984	12.89	11.92	13.12	13.81	12.69
1985	10.72	11.10	11.03	10.44	10.31
1986	9.08	10.26	9.07	8.73	8.24
1987(r)	9.11	9.14	9.44	8.78	9.09
1988	9.92	9.41	9.05	10.44	10.79

r - Revised.

Source: Federal Reserve Board.

COMPARATIVE CAPACITY UTILIZATION MEASURES
Total Manufacturing, 1969 to Date

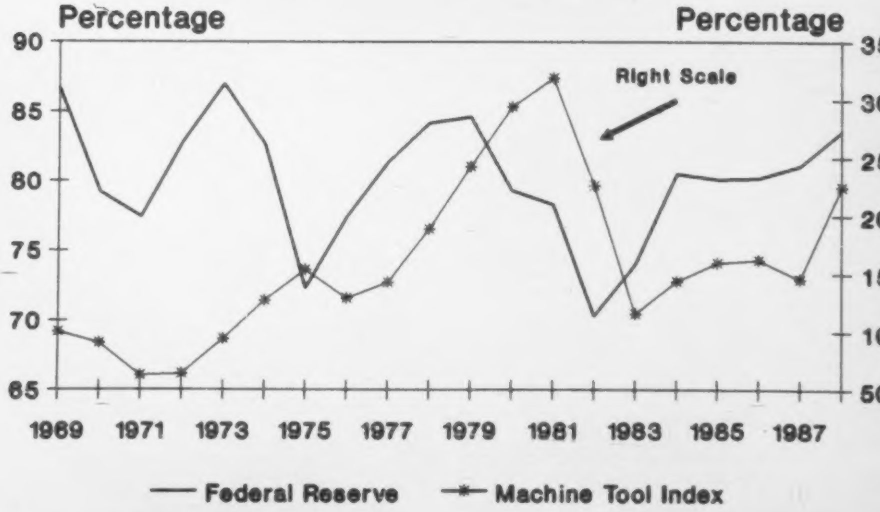
Year	Federal Reserve Board	Bureau of Economic Analysis	Data Resources, Inc.
1969	86.7%	85%	84.5%
1970	79.2	81	78.6
1971	77.4	80	77.8
1972	82.8	83	82.1
1973	87.0	86	85.9
1974	82.6	83	82.8
1975	72.3	77	73.3
1976	77.4	81	78.2
1977	81.4	83	80.4
1978	84.2	84	82.9
1979	84.6	83	83.9
1980	79.3	78	77.3
1981	78.3	76	77.7
1982	70.3	70	70.5
1983	74.0	74	74.1
1984	80.5	(a)	80.1
1985	80.1	(a)	79.3
1986	80.2	(a)	80.3
1987	81.1	(a)	81.7
1988	83.6	(a)	83.0

(a) The publication of this data was discontinued in 1983.

Sources: Federal Reserve Board; U.S. Department of Commerce, Bureau of Economic Analysis; Data Resources, Inc.

For further explanation of "Capacity Utilization" see chapter introduction.

CAPACITY UTILIZATION
Total Manufacturing



Machine Tool Index Based on 1969 Net New Orders=100

CAPACITY UTILIZATION IN MANUFACTURING
Federal Reserve Board, Operating Rates (a)
1969 to Date

Year	Total Mfg.	Total Durables	Electrical Machinery	Machinery, Except Electrical	Motor Vehicles(b)	Primary Metals	Fabricated Metals
1969	86.7%	86.1%	82.3%	86.0%	90.5%	91.7%	83.3%
1970	79.2	76.1	73.5	77.9	68.8	83.0	74.4
1971	77.4	73.3	70.0	69.0	82.2	76.7	72.1
1972	82.8	79.7	76.8	77.6	86.0	85.8	77.4
1973	87.0	86.2	84.2	86.6	94.5	96.6	84.0
1974	82.6	81.6	79.9	87.1	78.4	92.1	78.8
1975	72.3	69.6	66.0	72.0	64.5	72.9	67.3
1976	77.4	74.8	71.6	72.7	81.1	80.7	74.0
1977	81.4	79.4	78.6	77.8	89.1	81.0	80.1
1978	84.2	82.9	83.3	82.1	89.0	87.0	83.8
1979	84.6	84.1	87.2	84.2	78.2	88.6	85.5
1980	79.3	77.9	84.6	79.2	57.8	74.7	78.4
1981	78.3	76.7	80.0	78.5	59.0	78.3	77.3
1982	70.3	66.9	70.5	67.0	54.3	54.2	65.4
1983	74.0	70.3	72.7	66.4	68.9	62.0	67.2
1984	80.8	79.0	80.2	76.5	82.5	72.5	77.4
1985	80.3	78.3	73.7	74.9	83.9	73.1	81.0
1986	79.8	76.7	71.5	71.1	79.8	69.1	80.4
1987	81.1	78.4	75.4	74.6	79.2	79.3	78.2
1988	83.6	81.8	77.6	81.3	82.0	87.5	83.3
1983 1st Qtr.	70.2	66.0	68.6	62.4	59.4	55.2	63.3
2nd Qtr.	72.5	68.5	70.9	65.0	64.8	58.3	65.0
3rd Qtr.	75.8	72.1	74.1	68.3	72.7	64.5	68.7
4th Qtr.	77.4	74.5	77.2	70.0	78.6	69.9	71.7
1984 1st Qtr.	79.8	77.6	79.0	73.5	84.5	73.1	75.1
2nd Qtr.	80.8	78.8	79.9	76.7	81.4	72.2	77.0
3rd Qtr.	81.6	80.0	81.0	78.6	82.2	73.0	78.4
4th Qtr.	81.0	79.4	80.8	76.9	81.7	71.7	79.3
1985 1st Qtr.	80.5	79.0	77.2	75.9	84.9	73.1	80.8
2nd Qtr.	80.3	78.5	74.1	76.1	82.7	71.0	81.3
3rd Qtr.	80.3	78.1	71.5	75.0	84.9	72.9	80.7
4th Qtr.	80.0	77.7	71.9	72.6	83.1	75.2	81.2
1986 1st Qtr.	80.0	77.5	71.7	72.8	82.3	72.3	81.2
2nd Qtr.	79.5	76.4	71.2	70.9	79.8	68.1	80.1
3rd Qtr.	79.7	76.3	71.4	70.9	79.4	67.4	79.5
4th Qtr.	79.8	76.5	71.7	69.9	77.8	68.7	80.7
1987 1st Qtr.	80.0	77.5	74.7	71.9	82.3	72.1	77.5
2nd Qtr.	80.5	77.6	74.5	73.8	78.0	74.8	77.6
3rd Qtr.	81.4	78.5	75.7	75.7	76.5	81.6	77.8
4th Qtr.	82.3	80.0	76.5	76.8	80.0	88.8	79.9
1988 1st Qtr.	82.7	80.4	76.9	78.7	77.8	84.7	81.9
2nd Qtr.	83.2	81.5	77.4	81.0	82.5	85.7	82.7
3rd Qtr.	84.0	82.4	78.2	82.6	82.0	89.7	83.9
4th Qtr.	84.4	82.9	78.0	82.9	85.8	90.0	84.5
1989 1st Qtr.	84.3	82.8	77.2	84.3	85.0	88.5	84.0

r - Revised.

(a) Quarterly data is seasonally adjusted.
(b) Includes Parts.

Source: Federal Reserve Board.

CAPACITY UTILIZATION IN MANUFACTURING

Data Resources, Inc., Operating Rates, Seasonally Adjusted

1969 to Date

Year	Total Mfg.	Total Durables	Metal-working Industries	Fabricated Metals	Electrical Machinery	Machinery, except Electrical	Motor Vehicles and Parts
1969	84.5%	84.0%	84.3%	81.4%	78.0%	87.9%	94.3%
1970	78.6	75.1	73.3	72.5	67.3	79.6	74.0
1971	77.8	73.5	71.5	69.8	65.2	72.2	93.9
1972	82.1	78.7	76.8	72.6	70.9	77.5	103.5
1973	85.9	84.7	83.2	78.6	79.8	84.1	104.8
1974	82.8	80.9	79.6	78.5	78.6	84.1	76.7
1975	73.3	69.4	69.2	71.7	64.6	72.3	64.6
1976	78.2	75.0	74.2	77.8	73.2	75.0	76.1
1977	80.4	78.2	78.1	78.5	78.1	77.0	87.0
1978	82.9	81.5	81.4	81.8	82.0	81.1	85.5
1979	83.9	83.0	83.6	84.8	84.1	85.6	78.5
1980	77.3	74.6	76.1	75.3	76.6	81.3	59.3
1981	77.7	75.3	75.6	77.8	79.7	80.6	62.7
1982	70.5	66.0	67.7	65.0	74.1	68.0	59.1
1983	74.1	70.1	70.4	68.3	75.5	67.3	73.0
1984	80.1	78.3	78.6	76.8	81.1	78.2	85.4
1985	79.3	77.9	78.8	78.6	73.1	80.6	88.7
1986	80.3	78.9	78.6	75.9	72.9	77.4	95.1
1987(r)	81.7	80.7	79.4	74.0	76.2	78.6	96.4
1988(p)	83.0	82.5	81.2	76.0	76.9	82.8	98.6
1983 1st Qtr.	70.0	65.2	66.8	63.3	71.6	62.5	63.7
2nd Qtr.	72.9	68.5	68.5	66.4	74.3	65.8	69.2
3rd Qtr.	76.3	72.2	72.0	71.2	76.7	69.8	77.3
4th Qtr.	77.6	74.4	74.1	72.4	79.4	71.3	81.8
1984 1st Qtr.	79.5	77.5	77.3	74.9	81.6	74.6	87.0
2nd Qtr.	80.3	78.3	78.2	76.6	81.4	77.4	84.6
3rd Qtr.	80.9	79.2	79.9	77.9	81.7	80.7	85.3
4th Qtr.	79.6	78.2	79.2	77.5	79.7	80.1	84.6
1985 1st Qtr.	79.2	78.1	79.3	78.3	76.6	80.3	87.9
2nd Qtr.	79.3	77.9	79.1	78.9	73.9	81.5	87.5
3rd Qtr.	79.3	77.8	78.6	78.3	71.2	80.5	90.3
4th Qtr	79.2	77.6	78.2	79.0	70.7	80.2	88.8
1986 1st Qtr.	79.9	78.4	78.7	78.2	71.0	79.8	92.1
2nd Qtr.	80.1	78.5	78.3	75.9	72.1	77.0	95.0
3rd Qtr.	80.7	79.3	78.8	74.0	74.2	76.8	97.6
4th Qtr.	80.6	79.3	78.4	75.4	74.4	76.1	95.5
1987 1st Qtr.(r)	80.8	79.6	79.0	74.7	75.2	76.1	99.9
2nd Qtr.(r)	81.0	79.6	78.7	73.9	75.2	77.9	94.9
3rd Qtr.(r)	81.9	80.8	79.2	73.2	76.7	79.7	93.3
4th Qtr.(r)	82.9	82.8	80.7	74.3	77.7	80.7	97.7
1988 1st Qtr.(r)	82.6	82.1	80.6	75.4	77.6	81.9	94.6
2nd Qtr.(p)	82.7	82.5	81.3	75.7	77.1	83.1	99.6
3rd Qtr.(p)	83.2	82.7	81.4	76.3	77.0	83.6	98.2
4th Qtr.(p)	83.3	82.6	81.4	76.5	75.9	82.7	102.0
1989 1st Qtr.(p)	82.7	81.6	80.7	75.7	74.2	83.2	100.3

p - Preliminary. r - Revised.

Source: Data Resources, Inc.

INDUSTRIAL PRODUCTION INDEXES
Major and Selected Industry Groupings, 1969 to Date
1977 = 100 (Quantity of Output Basis)

Year	Total Industrial Production	Total Manufacturing	Durables	Primary Metals	Fabricated Metal Products	Nonelectrical Machinery
1969	81.2	80.6	84.0	101.9	88.4	75.2
1970	78.5	77.0	77.6	94.8	81.9	72.8
1971	79.6	78.2	77.3	89.9	81.5	67.6
1972	87.3	86.4	86.3	100.7	89.4	78.5
1973	94.4	94.0	96.3	114.3	99.4	91.7
1974	93.0	92.6	94.3	110.7	95.4	97.7
1975	84.8	83.4	82.6	88.2	82.7	84.5
1976	92.6	91.9	91.1	98.7	91.6	88.8
1977	100.0	100.0	100.0	100.0	100.0	100.0
1978	106.5	107.1	108.2	107.0	105.7	111.7
1979	110.7	111.5	113.9	108.5	109.4	122.6
1980	108.6	108.2	109.1	90.4	101.8	123.3
1981	111.0	110.5	111.1	95.0	101.6	129.8
1982	103.1	102.2	99.9	65.8	86.6	115.6
1983	109.2	110.2	107.7	73.0	89.1	118.3
1984	121.4	123.9	124.8	82.4	102.8	142.0
1985	123.7	127.1	128.2	80.6	107.9	146.4
1986	125.1	129.1	127.9	75.8	107.4	141.9
1987	129.8	134.7	133.1	81.3	111.0	152.7
1988	137.2	142.7	142.0	89.2	120.9	170.8

r - Revised.

Source: Federal Reserve Board.

INDUSTRIAL PRODUCTION INDEXES
(Continued)

Year	Electrical Machinery	Transportation Equipment	Motor Vehicles and Parts	Aerospace and Misc.	Instruments
1969	72.5	89.7	70.0	127.0	60.8
1970	69.3	75.3	56.3	111.9	60.3
1971	69.6	81.5	70.6	100.4	63.2
1972	79.7	87.0	77.1	103.7	70.9
1973	90.7	99.1	89.8	114.7	80.9
1974	89.8	90.1	77.5	111.3	85.7
1975	77.2	81.0	65.7	106.7	81.4
1976	86.8	92.2	86.5	101.7	89.4
1977	100.0	100.0	100.0	100.0	100.0
1978	112.9	106.3	104.6	108.7	111.5
1979	125.7	108.3	95.9	125.1	118.7
1980	130.3	96.9	71.1	132.0	122.0
1981	134.1	95.1	71.6	127.0	126.3
1982	128.4	87.6	66.8	115.7	125.3
1983	143.8	99.2	85.8	117.4	123.2
1984	172.4	113.6	105.6	124.4	136.9
1985	169.3	123.2	112.8	137.5	139.8
1986	166.5	125.8	110.9	146.1	141.3
1987	172.3	129.2	111.8	152.8	143.9
1988	180.1	132.1	117.2	168.0	154.3

Source: Federal Reserve Board.

PRODUCTIVITY IN MANUFACTURING(r)

Indexes, 1960 to Date

1977 = 100

Year	Productivity (a) (Output Per Hour of All Persons)	Constant Dollar Output	Hours (All Persons)	Compensation Per Hour		Unit Labor Costs
				Current	Real (b)	
1960	60.7	52.5	86.5	35.6	73.0	58.7
1961	62.4	52.6	84.3	36.7	74.3	58.7
1962	65.1	57.1	87.8	38.1	76.4	58.5
1963	69.5	61.6	88.6	39.2	77.7	56.4
1964	72.9	66.0	90.5	40.9	79.9	56.1
1965	74.8	71.7	95.8	41.7	80.2	55.7
1966	75.7	77.2	102.0	43.6	81.6	57.6
1967	75.9	77.0	101.4	46.0	83.4	60.6
1968	78.7	80.9	102.9	49.5	86.2	62.9
1969	79.9	83.2	104.1	53.1	87.7	66.5
1970	80.2	78.6	97.9	57.0	89.0	71.0
1971	84.6	79.9	94.5	60.4	90.3	71.4
1972	87.9	87.0	99.0	63.3	91.8	72.0
1973	92.6	96.3	104.0	68.2	93.1	73.7
1974	90.3	91.7	101.6	75.9	93.2	84.0
1975	92.6	84.9	91.6	84.9	95.6	91.7
1976	97.0	93.1	96.0	92.0	98.0	94.9
1977	100.0	100.0	100.0	100.0	100.0	100.0
1978	101.6	106.0	104.3	108.3	100.6	106.6
1979	101.6	108.1	106.3	118.9	99.2	117.0
1980	101.7	103.2	101.5	132.8	97.7	130.6
1981	104.0	104.8	100.8	145.7	97.1	140.1
1982	106.6	98.4	92.3	158.7	99.6	148.8
1983	112.2	104.7	93.4	162.7	99.0	145.1
1984	118.2	117.5	99.4	168.1	98.1	142.3
1985	123.5	122.0	98.7	176.3	99.3	142.7
1986	128.2	124.7	97.3	184.3	101.9	143.8
1987	132.9	130.1	97.9	189.2	100.9	142.3
1988	137.7	138.1	100.3	197.8	101.3	143.6
1988 1st Qtr.(p)	136.3	135.0	99.1	195.5	101.8	143.5
2nd Qtr.(p)	137.5	136.9	99.6	197.1	101.5	143.3
3rd Qtr.(p)	139.2	139.3	100.0	199.5	101.5	143.2
4th Qtr.(p)	140.0	141.1	100.7	202.3	101.9	144.5
1989 1st Qtr.(p)	140.7	142.2	101.0	203.9	101.3	144.8
2nd Qtr.(p)	141.6	142.9	100.9	205.1	100.4	144.9

p - Preliminary. r - Revised.

(a) The productivity index is obtained by dividing the constant dollar output index by the labor input (hours) index.
(b) Compensation per hour adjusted for changes in the CPI-U.

Source: U.S. Bureau of Labor Statistics.

This table is based on output and compensation data published by the Commerce Department's Bureau of Economic Analysis. The indexes for manufacturing output, which are based on figures taken from Gross National Product components, vary from those for manufacturing production in the tables of industrial production indexes. The latter are generated independently by the Federal Reserve Board from their own survey and using their own methodology.

SELECTED LEADING BUSINESS CYCLE INDICATORS

1959 to Date

		Selected Leading Indicators				
	Composite 11 Leading Indicators	Average Workweek, Mfg.	New Orders Consumer Goods	Orders for Plant & Equipment	Net Change in Manufacturer's Unfilled Orders	Change in Sensitive Prices
Year	1982 = 100	Hours	$82 Billion	$82 Billion	$82 Billion	Percent
1959	54.8	40.3	43.19	9.52	1.17	0.47
1960	53.8	39.7	40.66	9.28	−1.54	−0.20
1961	57.2	39.8	42.79	9.47	0.19	0.00
1962	60.2	40.4	45.55	10.28	0.17	−0.12
1963	64.2	40.5	48.89	11.27	1.82	0.12
1964	68.7	40.7	53.05	14.38	2.27	0.45
1965	73.0	41.2	57.97	15.74	2.74	0.32
1966	75.0	41.4	61.72	18.17	4.33	−0.19
1967	75.0	40.6	60.89	16.74	0.95	−0.48
1968	78.8	40.7	80.59	22.09	0.30	0.52
1969	82.0	40.6	67.50	23.67	0.78	0.68
1970	77.2	39.8	61.56	20.47	−3.03	−0.34
1971	83.3	39.9	64.27	21.46	−1.12	0.18
1972	92.3	40.5	72.61	23.59	1.29	1.22
1973	97.2	40.7	80.89	29.25	5.13	2.23
1974	89.0	40.0	74.50	29.13	1.92	0.58
1975	84.5	39.5	63.96	22.03	−5.12	−0.66
1976	96.2	40.1	73.01	24.72	−0.85	1.20
1977	101.0	40.3	65.15	27.28	0.90	0.28
1978	104.6	40.4	85.18	31.70	3.74	0.87
1979	103.6	40.2	83.59	33.82	2.72	1.34
1980	99.2	39.7	74.26	29.97	−1.06	0.36
1981	101.2	39.8	73.96	29.28	−1.09	−0.11
1982	100.0	38.9	65.15	24.77	−2.34	−0.87
1983	116.2	40.1	75.21	27.03	1.13	1.09
1984	121.8	40.7	82.28	31.78	2.31	0.21
1985	124.0	40.5	84.60	32.68	0.03	−0.79
1986	132.1	40.7	80.71	34.17	−0.08	0.28
1987	139.6	41.0	84.69	37.61	1.37	1.09
1988	142.5	41.1	87.21	44.55	1.83	0.45
1988 1st Qtr.	139.9	41.0	84.67	42.86	1.78	0.29
2nd Qtr.	142.3	41.1	87.11	43.67	1.28	0.54
3rd Qtr.	143.5	41.1	86.90	46.34	2.08	0.56
4th Qtr.	144.2	41.1	90.14	45.32	2.15	0.40

Source: U.S. Department of Commerce, Bureau of Economic Analysis, "Business Conditions Digest" (monthly); "Survey of Current Business" (monthly).

Eleven economic indicators normally precede changes in the business year. These are the "leading indicators," five of which are shown separately in the table together with the composite of the 11.

BUSINESS CYCLE REFERENCE DATES
1854 to Date

Trough		Peak		Expansion Duration (in Months)(a)
Dec.	1854	June	1857	30
Dec.	1858	Oct.	1860	22
June	1861	Apr.	1865	46(b)
Dec.	1867	June	1869	18
Dec.	1870	Oct.	1873	34
Mar.	1879	Mar.	1882	36
May	1885	Mar.	1887	22
Apr.	1888	July	1890	27
May	1891	Jan.	1893	20
June	1894	Dec.	1895	18
June	1897	June	1899	24
Dec.	1900	Sept.	1902	21
Aug.	1904	May	1907	33
June	1908	Jan.	1910	19
Jan.	1912	Jan.	1913	12
Dec.	1914	Aug.	1918	44(b)
Mar.	1919	Jan.	1920	10
July	1921	May	1923	22
July	1924	Oct.	1926	27
Nov.	1927	Aug.	1929	21
Mar.	1933	May	1937	50
June	1938	Feb.	1945	80(b)
Oct.	1945	Nov.	1948	37
Oct.	1949	July	1953	45(b)
May	1954	Aug.	1957	39
Apr.	1958	Apr.	1960	24
Feb.	1961	Dec.	1969	106(b)
Nov.	1970	Nov.	1973	36
Mar.	1975	Jan.	1980	58
July	1980	July	1981	12
Nov.	1982			
Average Peacetime Cycles:				
25 cycles, 1854–1981				27
11 cycles, 1919–1981				31
6 cycles, 1945–1981				34

(a) Time period from trough to peak.

(b) Wartime expansions (Civil War, World War I and II, Korean War and Vietnam War.)

Source: National Bureau of Economic Research, Inc.

The historical business cycle turning dates, above, are those designated by the National Bureau of Economic Research, Inc. (NBER). They mark the approximate dates when, according to the NBER, aggregate economic activity reached its cyclical high (peak) or low (trough) levels.

MANUFACTURERS' INVENTORIES
Major Industry Groups, 1972 to Date
(Current Cost(a) in Billions of Dollars, Seasonally Adjusted)

As of Dec. 31	Total Manufacturing	Durables	By Industry Group Primary Metals	By Industry Group Fabricated Metal Products	By Capital Goods Industries Nondefense	By Capital Goods Industries Defense
1972	$108.2	$ 70.3	$ 9.6	$ 8.5	$25.3	$ 4.3
1973	124.6	81.4	10.0	9.9	29.8	4.5
1974	157.8	101.7	13.4	13.4	37.5	4.9
1975	159.9	102.9	15.7	13.1	37.1	5.7
1976	175.2	112.6	17.6	14.4	37.7	6.5
1977	189.2	121.6	18.2	15.6	41.6	6.1
1978	210.5	137.9	19.4	17.3	49.4	6.4
1979	241.1	160.5	22.4	19.2	60.0	8.4
1980	264.3	174.6	23.0	19.6	68.5	10.7
1981	282.6	186.3	25.8	20.3	73.0	13.4
1982(r)	311.8	200.8	24.1	21.5	79.6	18.8
1983(r)	312.6	200.4	22.3	21.9	74.4	21.6
1984(r)	334.8	218.8	22.2	22.9	81.0	27.6
1985(r)	327.5	214.1	19.7	22.2	76.6	31.5
1986(r)	316.2	208.3	17.6	21.7	74.9	30.8
1987(r)	331.1	216.6	18.2	22.7	77.1	33.5
1988(p)	354.2	233.7	20.3	23.6	85.7	35.4

p - Preliminary. r - Revised.

(a) Data prior to 1982 is based on Book Value.

Sources: U.S. Bureau of the Census, "Manufacturers' Shipments, Inventories and Orders: 1982-1986" and Series M3-1 (monthly).

MANUFACTURERS' INVENTORIES
Selected Industry Groups, 1972 to Date
(Current Cost(a) in Billions of Dollars, Seasonally Adjusted)

As of Dec. 31	Nonelectrical Machinery	Electrical Machinery	Motor Vehicles and Parts	Other Transportation Equipment	Instruments and Related Products
1972	$15.1	$ 9.9	$ 4.7	$10.1	$ 3.2
1973	18.4	12.1	5.8	10.7	3.8
1974	24.1	14.0	6.7	12.5	4.9
1975	24.1	13.0	6.1	13.5	4.8
1976	25.3	14.5	8.0	13.1	5.4
1977	27.3	16.4	9.2	13.3	6.0
1978	31.7	18.9	10.3	15.8	6.9
1979	37.1	23.0	10.9	20.7	7.9
1980	40.7	25.9	9.9	26.1	9.1
1981	43.5	28.4	9.1	28.5	9.7
1982(r)	46.1	30.7	8.5	34.5	11.3
1983(r)	44.7	32.2	10.1	34.2	11.5
1984(r)	48.3	38.5	11.6	36.9	12.5
1985(r)	45.5	38.2	11.7	40.4	12.7
1986(r)	42.1	38.4	11.1	39.8	12.6
1987(r)	41.9	39.4	11.4	45.8	12.7
1988(p)	46.7	40.7	11.8	51.4	14.0

p - Preliminary. r - Revised.

(a) Data prior to 1982 is based on Book Value.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories and Orders: 1982-1986" and Series M3-1 (monthly).

MANUFACTURERS' NET NEW ORDERS
Major Industry Groups, 1972 to Date
(Billions of Dollars)

Year	Total Manufacturing	Durables	By Industry Group: Primary Metals	By Industry Group: Fabricated Metal Products	By Capital Goods Industries: Nondefense	By Capital Goods Industries: Defense
1972	$ 770.0	$ 420.8	$ 61.4	$ 52.9	$103.5	$ 20.8
1973	915.1	515.2	80.8	64.8	131.7	23.7
1974	1,047.2	562.2	99.0	74.4	152.1	25.7
1975	1,021.8	504.2	74.1	64.4	132.1	24.8
1976	1,194.5	616.8	94.5	76.2	153.6	31.1
1977	1,380.4	733.0	105.5	91.5	183.5	35.2
1978	1,578.6	868.1	124.6	104.6	233.5	41.8
1979	1,768.8	953.4	139.6	116.6	278.8	34.1
1980	1,873.9	952.3	134.1	115.3	279.1	58.7
1981	2,013.0	1,002.6	137.0	122.4	288.6	59.1
1982(r)	1,947.3	940.1	98.2	113.6	259.9	82.7
1983(r)	2,089.5	1,051.2	113.1	121.5	265.2	97.9
1984(r)	2,277.5	1,183.0	117.1	139.1	314.9	104.8
1985(r)	2,291.0	1,198.1	110.4	138.4	324.8	109.8
1986(r)	2,264.0	1,202.0	105.9	137.9	318.6	110.4
1987(r)	2,423.6	1,293.2	122.6	136.5	356.5	109.8
1988(p)	2,657.9	1,434.0	144.1	142.6	419.6	109.3

p - Preliminary. r - Revised.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories, and Orders: 1982-1986" and Series M3-1 (monthly).

MANUFACTURERS' UNFILLED ORDERS
Major Industry Groups, 1972 to Date
(Billions of Dollars, Seasonally Adjusted)

As of Dec. 31	Total Manufacturing	Durables	By Industry Group: Primary Metals	By Industry Group: Fabricated Metal Products	By Capital Goods Industries: Nondefense	By Capital Goods Industries: Defense
1972	$121.1	$114.7	$ 10.3	$15.1	$54.6	$19.7
1973	161.3	153.9	18.5	21.1	70.5	22.0
1974	191.1	165.6	21.9	28.2	86.8	26.3
1975	173.8	165.9	15.1	24.1	79.4	28.1
1976	182.5	174.2	16.8	23.0	81.7	32.0
1977	203.5	195.0	17.2	24.5	90.9	37.2
1978	259.8	249.5	23.9	27.8	117.0	47.7
1979	302.1	290.9	26.1	30.9	149.2	49.0
1980	323.4	312.6	26.3	30.1	156.0	67.1
1981	319.1	309.1	21.4	28.9	146.9	78.1
1982(r)	314.3	303.2	15.5	27.3	123.6	100.2
1983(r)	349.4	335.4	20.3	26.7	117.0	123.4
1984(r)	372.6	358.9	18.2	29.9	120.8	144.5
1985(r)	383.2	368.4	18.0	28.6	121.4	157.7
1986(r)	387.1	370.7	18.3	28.5	119.6	161.5
1987(r)	421.2	400.7	23.9	30.0	139.8	161.9
1988(p)	468.9	447.9	25.7	28.4	179.6	165.4

p - Preliminary. r - Revised.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories, and Orders: 1982-1986" and Series M3-1 (monthly).

MANUFACTURERS' NET NEW ORDERS

Selected Industry Groups, 1972 to Date

(Billions of Dollars)

Year	Nonelectrical Machinery	Electrical Machinery	Aircraft and Parts	Other Transportation Equipment	Machine Tools
1972	$ 70.9	$ 54.1	$ 21.0	$ 75.5	$1.4
1973	89.2	64.7	26.7	91.5	2.6
1974	105.3	67.8	29.9	84.1	2.6
1975	92.7	62.8	26.9	82.2	1.3
1976	107.4	77.0	31.9	111.7	2.2
1977	126.7	92.5	40.6	134.1	3.0
1978	154.5	106.8	54.9	158.2	4.3
1979	174.6	121.6	68.3	154.2	5.6
1980	180.6	135.6	73.1	129.0	4.8
1981	200.5	144.7	64.1	139.6	2.9
1982(r)	171.1	157.3	73.4	136.0	1.5
1983(r)	179.4	168.1	86.5	173.1	1.7
1984(r)	210.2	198.0	90.9	200.5	2.9
1985(r)	214.7	200.8	100.0	205.1	2.5
1986(r)	203.1	198.2	106.5	211.8	2.1
1987(r)	221.0	212.4	116.4	221.2	2.1
1988(p)	253.8	227.4	136.6	252.3	3.6

p - Preliminary. r - Revised.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories, and Orders: 1982-1986" and Series M3-1 (monthly); NMTBA "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments, and Backlog" (monthly).

MANUFACTURERS' UNFILLED ORDERS

Selected Industry Groups, 1972 to Date

(Billions of Dollars, Seasonally Adjusted)

As of Dec. 31	Nonelectrical Machinery	Electrical Machinery	Aircraft and Parts	Other Transportation Equipment	Machine Tools
1972	$27.5	$18.0	$ 26.2	$11.5	$1.0
1973	38.9	22.0	27.8	17.4	2.1
1974	51.9	24.0	30.4	20.6	2.6
1975	48.9	22.7	28.1	18.4	1.5
1976	50.8	25.9	28.9	19.6	1.6
1977	55.4	30.1	37.3	19.1	2.3
1978	66.8	36.5	54.8	26.0	3.6
1979	75.0	42.2	75.1	27.0	5.4
1980	74.8	49.3	89.7	27.9	5.5
1981	73.8	53.8	89.1	27.0	3.3
1982(r)	54.0	62.8	93.4	32.2	1.2
1983(r)	54.5	71.9	104.9	36.1	1.0
1984(r)	54.4	82.4	116.9	34.1	1.7
1985(r)	53.8	89.9	126.0	28.6	1.7
1986(r)	48.3	91.9	131.5	27.6	1.2
1987(r)	52.7	93.7	144.3	29.4	1.0
1988(p)	60.0	93.5	174.7	37.4	2.2

p - Preliminary. r - Revised.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories, and Orders: 1982-1986" and Series M3-1 (monthly); NMTBA "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments, and Backlog" (monthly).

MANUFACTURERS' SHIPMENTS
Major Industry Groups, 1972 to Date
(Billions of Dollars)

Year	Total Manufacturing	Durables	By Industry Group		By Capital Goods Industries	
			Primary Metals	Fabricated Metal Products	Nondefense	Defense
1972	$ 756.3	$ 408.3	$ 58.4	$ 51.5	$ 97.9	$ 20.2
1973	875.2	476.2	72.7	58.9	115.8	21.4
1974	1,017.5	530.7	95.6	67.3	135.9	21.3
1975	1,039.1	523.9	80.8	68.5	139.6	23.0
1976	1,185.6	608.3	93.0	77.4	151.4	26.7
1977	1,358.4	711.2	103.2	90.0	174.5	30.1
1978	1,522.9	814.2	118.1	101.3	207.6	31.2
1979	1,727.2	912.7	137.4	113.6	247.1	32.9
1980	1,852.7	930.6	133.9	116.2	272.4	40.6
1981	2,017.5	1,006.5	141.9	123.7	297.7	48.2
1982	1,960.2	952.2	104.7	119.4	281.0	60.4
1983	2,054.9	1,019.5	106.5	122.1	271.8	74.5
1984	2,254.4	1,159.5	119.1	135.9	311.1	83.8
1985(r)	2,280.2	1,188.2	110.5	139.6	324.2	96.7
1986(r)	2,260.3	1,199.9	105.6	138.0	320.3	106.8
1987(r)	2,390.0	1,263.5	117.1	135.0	336.2	109.4
1988(p)	2,610.9	1,387.8	142.2	144.1	380.0	106.6

p - Preliminary. r - Revised.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories, and Orders: 1982-1986" and Series M3-1 (monthly).

MANUFACTURERS' SHIPMENTS
Major Industry Groups, 1972 to Date
(Billions of Dollars)

Year	Nonelectrical Machinery	Electrical Machinery	Motor Vehicles and Parts	Other Transportation Equipment	Instruments and Related Products	Machine Tools
1972	$ 65.8	$ 53.4	$ 63.9	$ 30.8	$15.5	$1.0
1973	77.8	60.9	74.8	35.8	17.9	1.5
1974	92.5	65.8	68.6	39.6	21.0	2.0
1975	95.8	64.2	70.0	43.5	22.1	2.5
1976	105.5	73.9	95.4	45.6	25.0	2.1
1977	122.2	88.4	117.7	49.2	28.9	2.3
1978	143.2	100.5	132.0	56.8	33.7	3.0
1979	166.5	116.0	131.4	70.2	37.7	3.9
1980	180.7	128.6	104.6	82.0	44.1	4.7
1981	201.5	140.2	117.0	88.2	48.3	5.1
1982	187.9	147.9	112.3	89.1	51.8	3.6
1983	179.0	159.2	147.3	96.8	53.6	1.8
1984	210.4	187.6	179.3	101.9	59.4	2.3
1985(r)	215.2	193.4	188.5	112.9	61.0	2.5
1986(r)	208.5	196.2	191.6	122.3	61.9	2.6
1987(r)	216.6	210.7	197.0	126.0	66.8	2.3
1988(p)	246.8	227.1	219.2	132.7	72.4	2.4

p - Preliminary. r - Revised.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories, and Orders: 1982-1986" and Series M3-1 (monthly); NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments, and Backlog" (monthly).

SHIPMENTS: METALWORKING MACHINERY AND MACHINE TOOLS

Monthly, 1982 to Date

(Millions of Dollars, Not Seasonally Adjusted)

Month	1982	1983	1984	1985	1986	1987	1988
Metalworking Machinery Industry (SIC 354) (a)							
Jan.	$ 923	$ 624	$ 615	$ 599	$ 629	$ 589	$ 680
Feb.	960	628	696	719	762	720	809
Mar.	993	649	767	860	845	906	936
Apr.	821	595	706	671	703	674	735
May	791	596	710	716	696	722	933
June	889	610	733	825	819	839	1,005
July	718	530	619	694	604	613	817
Aug.	761	598	659	673	629	610	897
Sept.	767	719	779	833	839	855	1,035
Oct.	674	699	800	850	873	834	1,010
Nov.	650	649	686	732	768	822	1,038
Dec.	664	658	816	856	756	829	1,181
TOTAL	$9,611	$7,555	$8,586	$9,028	$8,923	$9,013	$11,076
Machine Tools (SIC 3541 & 3542)(b)							
Jan.	$ 384	$ 153	$ 113	$ 138	$ 146	$ 148	$ 143
Feb.	360	158	147	166	203	147	166
Mar.	411	176	189	228	249	183	207
Apr.	303	151	159	170	210	172	157
May	296	136	210	177	230	209	180
June	409	183	204	239	312	233	214
July	250	112	194	195	190	198	188
Aug.	257	113	164	216	151	158	154
Sept.	276	132	211	244	208	200	228
Oct.	201	145	206	199	243	210	212
Nov.	194	148	212	199	167	178	258
Dec.	264	238	276	347	271	288	293
TOTAL	$3,604	$1,845	$2,286	$2,545	$2,579	$2,324	$2,399

(a) Adjusted for trading-day and calendar month variation.
(b) Shipments of new machine tools and accessories ordered with them.

Note: Individual items may not add to totals due to rounding.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories and Orders: 1982-86" and Series M3-1 (monthly); NMTBA "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

The cyclical nature of the machine tool industry is apparent in both new orders and shipment figures. Shipments totaled almost $2.5 billion by 1975, dropped by 16% in 1976, grew to almost $5.1 billion in 1981. In 1982 shipments fell 29% and declined another 49% to $1.8 billion in 1983. In 1984 and 1985 shipments rose 24% and 11%, respectively. Shipments in 1986 increased a marginal 1%, but fell by 10% in 1987, before recovering slightly in 1988.

NET NEW ORDERS: METALWORKING MACHINERY AND MACHINE TOOLS

Monthly, 1982 to Date

(Millions of Dollars, Not Seasonally Adjusted)

Month	1982	1983	1984	1985	1986	1987	1988
Metalworking Machinery Industry (SIC 354)(a)							
Jan.	$ 684	$ 480	$ 703	$ 707	$ 638	$ 636	$ 846
Feb.	603	589	772	825	708	665	954
Mar.	596	579	780	968	793	890	1,094
Apr.	540	585	732	787	714	725	981
May	560	626	806	774	738	701	1,024
June	754	648	759	943	684	781	1,415
July	524	593	982	862	677	719	1,111
Aug.	635	722	806	684	640	659	1,044
Sept.	516	672	849	832	782	891	1,134
Oct.	557	775	728	842	736	718	953
Nov.	511	686	724	577	702	775	1,270
Dec.	524	561	896	465	578	735	1,087
TOTAL	$7,004	$7,516	$9,537	$9,266	$8,390	$8,895	$12,916
Machine Tools (SIC 3541 & 3542)(b)							
Jan.	$ 205	$ 92	$ 189	$ 211	$ 191	$ 147	$ 298
Feb.	164	98	203	238	210	153	298
Mar.	138	126	208	279	215	164	254
Apr.	151	119	253	184	193	130	253
May	106	135	320	223	206	186	325
June	126	145	192	235	201	203	383
July	107	175	313	200	170	163	255
Aug.	87	137	201	185	154	142	340
Sept.	87	156	286	174	135	183	328
Oct.	119	203	284	230	180	257	262
Nov.	88	160	212	195	133	[illegible]	279
Dec.	121	151	255	175	137	241	316
TOTAL	$1,498	$1,696	$2,916	$2,528	$2,125	$2,119	$3,591

(a) Adjusted for trading-day and calendar month variation.
(b) Net new orders for new machine tools and accessories ordered with them.

Note: Individual items may not add to totals due to rounding.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories and Orders: 1982-86" and Series M3-1 (monthly); NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

The most dramatic indicator of the cyclical nature of the machine tool business is new orders. These generally follow the overall movement of the economy but the cycles involved are much more pronounced. For example, in 1975 new orders were only 45% of the level experienced in 1973. However, the economic recovery following the 1974 recession was especially strong in the machine tool sector and by 1979 orders were running at record levels, well in excess of $5 billion per year. This strength in machine tool orders continued into early 1980, and then began a long, steady decline until late 1982. As a mark of the severity of the recession, machine tool orders for 1982 were only 27% of their 1979 record total. Monthly order placements demonstrated gradual improvement throughout 1983, and in 1984 there was a dramatic year-to-year increase of 72%. Since 1984, net new orders have declined every year. The failure of the industry to experience a recovery in step with the general economy has threatened the future of many domestic machine tool building firms. Fortunately, the fourth quarter of 1987 was a relatively strong one for machine tool orders and the figures for 1988 continued at levels substantially higher than in recent years.

UNFILLED ORDERS: METALWORKING MACHINERY AND MACHINE TOOLS

Monthly, 1982 to Date

(Millions of Dollars, Not Seasonally Adjusted)

Month	1982	1983	1984	1985	1986	1987	1988
Metalworking Machinery Industry (SIC 354)(a)							
Jan.	$4,696	$2,203	$2,379	$3,299	$3,418	$2,890	$2,824
Feb.	4,341	2,165	2,451	3,399	3,365	2,878	3,062
Mar.	3,947	2,097	2,463	3,501	3,314	2,863	3,217
Apr.	3,667	2,086	2,487	3,610	3,323	2,911	3,458
May	3,438	2,114	2,578	3,664	3,361	2,891	3,622
June	3,302	2,150	2,603	3,776	3,231	2,837	3,959
July	3,109	2,210	2,949	3,935	3,299	2,937	4,253
Aug.	2,982	2,328	3,089	3,944	3,307	2,938	4,400
Sept.	2,735	2,282	3,155	3,942	3,252	3,017	4,499
Oct.	2,618	2,354	3,086	3,933	3,121	2,908	4,444
Nov.	2,480	2,389	3,121	3,784	3,057	2,863	4,676
Dec.	2,342	2,295	3,197	3,411	2,865	2,736	4,546
Machine Tools (SIC 3541 & 3542)(b)							
Jan.	$3,122	$1,133	$1,121	$1,748	$1,702	$1,203	$1,154
Feb.	2,926	1,072	1,176	1,840	1,710	1,210	1,285
Mar.	2,653	1,021	1,196	1,871	1,676	1,191	1,333
Apr.	2,500	989	1,290	1,885	1,660	1,149	1,429
May	2,310	988	1,400	1,930	1,636	1,129	1,574
June	2,027	950	1,388	1,927	1,526	1,098	1,742
July	1,883	1,013	1,507	1,932	1,506	1,064	1,810
Aug.	1,713	1,037	1,544	1,900	1,509	1,047	1,995
Sept.	1,524	1,062	1,619	1,830	1,436	1,030	2,096
Oct.	1,442	1,119	1,695	1,861	1,373	1,087	2,146
Nov.	1,337	1,131	1,695	1,857	1,339	1,047	2,167
Dec.	1,194	1,045	1,675	1,658	1,204	1,000	2,191

(a) Adjusted for trading-day and calendar month variation.
(b) Net new orders for new machine tools and accessories ordered with them.

Note: Individual items may not add to totals due to rounding.

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories and Orders: 1982–88" and Series M3-1 (monthly); NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

Because they must incorporate a variety of customer-specified options, machine tools are generally "built to order" rather than being built for inventory. This order-taking procedure results in the backlog of unfilled orders, machines ordered by customers but not yet shipped, for which statistics appear above. The backlog of unfilled orders for machine tools, which had increased continuously for four years, peaked in mid-1980 at just over $5.6 billion. The slack pace of the economy after that saw the accumulated volume of unfilled orders drop to just $1.0 billion by the end of 1983. The order recovery in 1984 led to a sharp increase for the year but total outstanding unfilled order levels in 1984–1987 were nonetheless in line with prevailing shipping rates. With new orders increasing nearly 70 percent during 1988, the backlog of unfilled orders more than doubled compared with 1987.

PRODUCER PRICE INDEXES
For Selected Machine Tool Materials and Components
1982 = 100, unless otherwise indicated

Commodity	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Finished Goods	77.6	88.0	96.1	100.0	101.6	103.7	104.7	103.2	105.4	108.0
All Commodities	78.7	89.8	98.0	100.0	101.3	103.7	103.2	100.2	102.8	106.9
Industrial Commodities	75.7	88.0	97.4	100.0	101.1	103.3	103.7	100.0	102.6	106.3
Durable Manufactured Goods	80.8	89.6	96.4	100.0	102.7	105.0	106.5	107.5	109.6	114.1
Industrial Power, 500 KW Demand	64.5	77.8	89.2	100.0	103.1	108.4	112.8	114.5	112.1	112.6
Prepared Paint	77.8	89.5	95.1	100.0	100.7	103.7	105.3	107.0	108.1	112.2
Iron and Steel	83.6	90.0	98.5	100.0	101.3	105.3	104.8	101.1	104.5	115.7
Foundry and Forge Shop Products	80.2	89.7	95.4	100.0	101.6	104.4	105.2	105.2	105.6	109.6
Gray & Ductile Iron Cast	NA	NA	95.1	100.0	99.9	101.0	103.3	103.7	103.4	106.0
Steel Mill Products	80.2	86.6	96.6	100.0	100.9	104.7	104.7	99.8	102.3	110.7
Semi-finished Steel Products	79.5	88.0	97.1	100.0	100.1	100.3	100.3	99.0	100.2	108.9
Finished Steel Products	80.3	86.6	96.6	100.0	100.5	104.3	104.5	99.9	102.3	110.6
Nonferrous Metals	99.3	115.7	108.4	100.0	104.7	105.1	99.6	98.5	108.7	133.2
Primary Nonferrous Metals	103.9	132.7	114.7	100.0	106.8	101.3	93.6	93.8	109.2	144.3
Nonferrous Mill Shapes	89.7	97.1	100.8	100.0	103.1	106.7	102.9	99.9	105.7	130.2
Aluminum Mill Shapes	82.8	89.3	98.3	100.0	102.2	112.0	107.8	102.6	105.5	130.9
Nonferrous Wire and Cable	92.1	107.5	102.5	100.0	100.7	99.9	100.9	101.8	106.5	129.7
Metalworking Machinery and Equipment	75.2	85.5	93.9	100.0	101.7	104.1	106.6	108.4	110.1	113.5
Cutting Tools & Access.	76.3	86.0	94.5	100.0	101.3	103.0	105.7	107.5	108.9	111.0
Abrasive Products	75.2	85.1	93.1	100.0	102.6	103.3	105.9	106.7	108.1	111.3
Metal Cutting Machine Tools	72.4	85.1	93.6	100.0	102.1	104.6	107.3	109.6	112.6	117.4
Metal Forming Machine Tools	74.1	85.7	94.0	100.0	102.7	104.7	107.0	108.7	110.2	113.2
General Purpose Machy. & Equipment	77.8	87.0	95.0	100.0	101.4	103.3	105.7	107.2	108.3	112.7
Pumps, Compressors, & Equipment	71.7	82.8	93.4	100.0	100.0	100.7	102.6	104.1	105.2	108.9
Fluid Power Equipment	72.1	81.7	91.0	100.0	103.5	106.1	108.1	109.8	111.3	114.6
Fluid Power Pumps	71.4	81.0	91.3	100.0	104.9	104.0	105.9	108.2	110.3	114.3
Fluid Power Valves	72.9	81.2	90.0	100.0	101.6	105.5	107.6	109.0	110.9	114.9
Fluid Power Hose and Tube Fittings	74.6	85.7	93.8	100.0	100.5	102.9	105.9	107.3	109.0	110.1
Mechanical Power Transmission Equipment	75.1	84.5	94.4	100.0	101.1	104.4	108.2	110.6	112.0	116.0
Miscellaneous General Purpose Equipment	76.2	86.3	94.9	100.0	100.4	103.4	106.2	107.7	109.0	115.4
Ball & Roller Bearings	68.5	80.0	91.9	100.0	100.1	102.9	105.9	107.3	107.8	113.8
Electrical Machinery and Equipment	77.2	87.1	95.1	100.0	103.7	107.4	109.6	111.2	112.7	114.4
Motors, Generators, Motor Generator Sets	75.7	86.0	95.6	100.0	106.4	109.8	113.3	113.5	115.4	121.8
Integral Elec. Motors, AC June 1983 = 100	NA	NA	NA	NA	NA	109.3	110.7	106.1	105.6	113.9
Transformers and Power Regulators	74.1	82.4	94.2	100.0	100.7	102.6	105.0	105.6	107.6	108.8
Switchgear, Switchboard, etc. Equipment	75.8	88.4	95.1	100.0	103.3	105.0	106.7	108.1	110.2	113.2
Electronic Components and Accessories	77.1	88.8	95.5	100.0	104.3	109.8	112.4	114.5	115.1	117.5

NA - Not Available.

Note: The individual commodities shown are selected components of each major commodity grouping. All indexes are annual averages.

Source: U. S. Department of Labor, Bureau of Labor Statistics.

FIXED WEIGHT PRICE INDEXES FOR NATIONAL DEFENSE PURCHASES OF GOODS AND SERVICES

By Major Type of Product, 1979 to Date

(Index 1982 = 100)

Year	Total Purchases	Durable Goods	Non-Durable Goods	Services(a)	Structures	Compensation
1979	75.1	75.5	61.9	75.5	84.4	75.4
1980	84.7	84.9	87.9	84.2	95.4	82.8
1981	93.8	94.4	102.0	92.3	99.4	92.0
1982	100.0	100.0	100.0	100.0	100.0	100.0
1983	103.7	104.0	93.1	104.9	101.4	104.7
1984	107.6	109.8	89.6	107.9	103.5	109.2
1985(r)	110.5	110.6	88.0	110.3	108.8	114.2
1986(r)	111.3	110.2	69.0	114.3	117.2	117.1
1987(r)	114.0	109.0	68.7	117.8	121.7	122.0
1988(p)	117.6	109.6	73.1	121.9	127.0	126.8

p - Preliminary. r - Revised.

(a) Services excluding Compensation.

Source: U. S. Department of Commerce, "Survey of Current Business" (monthly).

NATIONAL DEFENSE PURCHASES

By Major Type of Product, 1976 to Date

Year	Total Purchases	Durable Goods	Non-Durable Goods	Services(a)	Structures	Compensation
In Current Dollars (Billions)						
1976	$ 93.4	$18.4	$ 4.7	$18.9	$2.1	$ 49.3
1977	100.9	21.9	5.1	19.7	2.4	51.8
1978	108.9	23.6	5.6	21.4	2.5	55.8
1979	121.9	28.7	6.7	24.3	2.5	59.7
1980	142.7	33.0	10.9	29.7	3.1	66.0
1981	167.5	39.8	12.7	36.2	3.2	75.6
1982	193.8	49.2	13.6	43.1	3.9	84.0
1983	214.4	58.1	12.6	49.3	4.8	89.6
1984	234.3	66.0	12.1	56.5	4.9	94.8
1985(r)	259.1	76.4	11.9	63.9	6.1	100.9
1986(r)	277.5	83.5	11.1	72.4	6.6	104.0
1987(r)	295.3	89.8	10.5	78.9	7.2	108.9
1988(p)	298.4	84.1	11.0	83.3	7.1	112.9
In Constant 1982 Dollars (Billions)						
1976	$157.5	$30.6	$11.3	$32.0	$3.4	$ 80.2
1977	159.2	34.3	11.2	30.5	3.6	79.5
1978	160.7	35.0	11.4	31.0	3.4	79.9
1979	164.3	38.9	10.8	32.5	2.9	79.1
1980	171.2	40.3	12.4	35.6	3.3	79.7
1981	180.3	43.3	12.5	39.2	3.2	82.1
1982	193.8	49.2	13.6	43.1	3.9	84.0
1983	206.9	56.1	13.5	47.0	4.8	85.6
1984	218.5	61.2	13.4	52.4	4.7	86.8
1985(r)	237.2	72.1	13.4	57.9	5.6	88.3
1986(r)	251.4	78.1	15.4	63.4	5.6	88.8
1987(r)	264.9	87.9	14.7	67.2	5.9	89.3
1988(p)	261.8	84.1	14.3	68.7	5.6	89.1

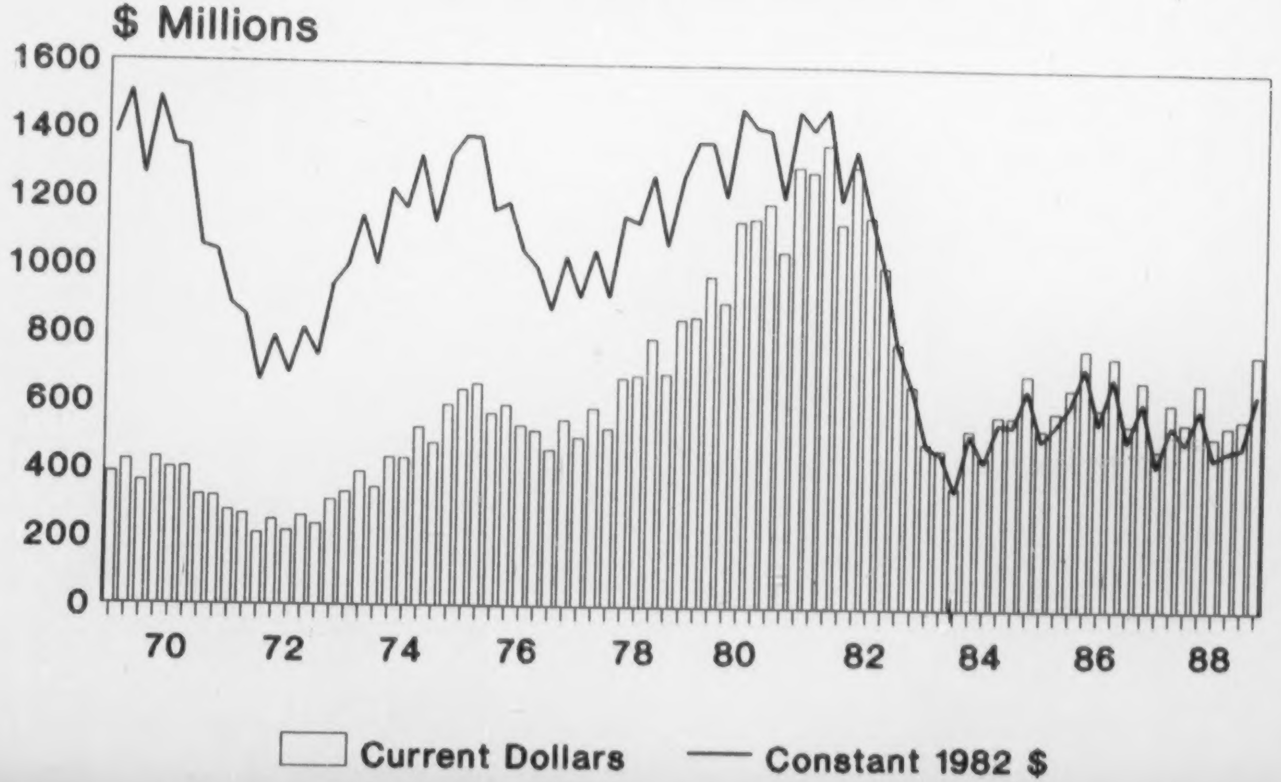
p - Preliminary. r - Revised.

(a) Services excluding Compensation.

Source: U. S. Department of Commerce, "Survey of Current Business" (monthly).

The estimates in the above table are from a report prepared by the Bureau of Economic Analysis (BEA). Prior to 1980, the BEA included only Department of Defense purchases in the defense spending series. Beginning in 1980, their statistics include defense activities of other Federal agencies as well. These tables have been revised to reflect that change.

QUARTERLY SHIPMENTS OF MACHINE TOOLS



PRODUCER PRICES INDEXES FOR MACHINE TOOLS

1949 to Date

1982 = 100

Year	All Commodities	Durable Manufactured Goods	Total(a) Machine Tools	Metal Cutting Machine Tools	Metal Forming Machine Tools
1949	26.3	24.1	11.2	11.2	11.1
1950	27.3	24.9	12.0	12.0	12.1
1951	30.4	27.3	14.0	14.0	13.8
1952	29.6	27.4	15.0	15.0	14.5
1953	29.2	28.0	15.1	15.1	14.8
1954	29.3	28.4	15.2	15.2	14.9
1955	29.3	29.4	15.8	15.8	16.1
1956	30.3	31.3	18.1	18.0	18.2
1957	31.2	32.5	19.3	19.3	19.2
1958	31.6	32.9	19.5	19.7	19.0
1959	31.7	33.6	19.9	20.2	19.1
1960	31.7	33.6	20.5	20.8	19.7
1961	31.6	33.5	20.9	21.4	19.6
1962	31.7	33.4	21.4	21.8	20.1
1963	31.6	33.5	21.4	21.9	20.2
1964	31.6	33.8	22.3	22.8	20.9
1965	32.3	34.2	23.5	24.0	22.1
1966	33.3	35.0	25.0	25.5	23.6
1967	33.4	35.7	26.5	27.1	24.7
1968	34.2	37.0	27.5	28.0	25.7
1969	35.6	38.5	28.4	29.0	26.5
1970	36.9	40.0	30.1	30.8	28.6
1971	38.1	41.8	31.2	31.8	29.9
1972	39.8	43.3	32.1	32.6	31.0
1973	45.0	45.5	34.3	34.8	32.9
1974	53.5	53.1	40.9	41.2	40.0
1975	58.4	59.2	48.0	48.1	47.5
1976	61.1	62.7	52.0	51.8	52.6
1977	64.9	67.2	56.4	56.0	57.5
1978	69.9	73.2	63.4	62.8	64.9
1979	78.7	80.8	72.8	72.4	74.2
1980	89.8	89.6	85.2	85.1	85.7
1981	98.0	96.4	93.7	93.6	94.0
1982	100.0	100.0	100.0	100.0	100.0
1983	101.3	102.7	102.3	102.1	102.7
1984	103.7	105.0	104.7	104.7	104.7
1985	103.2	106.5	107.2	107.3	107.0
1986	100.2	107.5	109.4	109.6	108.7
1987	102.8	109.6	111.9	112.6	110.2
1988	106.9	114.0	115.9	117.4	113.2

(a) Constructed by NMTBA from BLS producer price indexes for metal cutting and metal forming machine tools using NMTBA shipments weights.

Source: U. S. Dept. of Labor, Bureau of Labor Statistics: U.S. Dept. of Commerce, "Business Statistics, 1977," "Survey of Current Business" (monthly), and NMTBA.

Because of the continuous technological improvement in machine tools and the increasing number of "custom built" machines, reliable wholesale price indexes (which are intended to measure price changes not influenced by changes in quality, product mix, etc.) are difficult to develop. The data should be used with caution.

SHIPMENTS OF MACHINE TOOLS IN CONSTANT AND CURRENT DOLLARS

1949 to Date

Year	Total Industry(a)		Metal Cutting		Metal Forming(a)	
	Current Dollars (Thousands)	1982 Dollars (Thousands)	Current Dollars (Thousands)	1982 Dollars (Thousands)	Current Dollars (Thousands)	1982 Dollars (Thousands)
1949	$ 249,150	$2,224,554	$ 249,150	$2,224,554	—	—
1950	305,550	2,546,250	305,550	2,546,250	—	—
1951	632,250	4,516,079	632,250	4,516,079	—	—
1952	1,125,900	7,506,000	1,125,900	7,506,000	—	—
1953	1,191,200	7,888,742	1,191,200	7,888,742	—	—
1954	891,750	5,866,776	891,750	5,866,776	—	—
1955	670,400	4,243,038	670,400	4,243,038	—	—
1956	1,377,300	7,625,287	945,200	5,251,111	$ 432,100	$2,374,176
1957	1,242,700	6,448,104	900,150	4,663,990	342,550	1,784,115
1958	591,200	3,029,591	438,400	2,225,381	152,800	804,211
1959	616,000	3,099,513	440,600	2,181,188	175,400	918,325
1960	744,000	3,631,284	541,500	2,603,365	202,500	1,027,919
1961	750,900	3,598,848	541,250	2,529,206	209,650	1,069,643
1962	821,250	3,848,054	612,850	2,811,239	208,400	1,036,816
1963	895,750	4,189,059	638,450	2,915,297	257,300	1,273,762
1964	1,164,350	5,234,270	844,650	3,704,605	319,780	1,529,665
1965	1,425,600	6,084,381	1,022,550	4,260,625	403,050	1,823,756
1966	1,685,200	6,754,948	1,221,750	4,791,176	463,450	1,963,771
1967	1,805,950	6,826,354	1,353,200	4,993,358	452,750	1,832,996
1968	1,726,900	6,285,313	1,358,300	4,851,071	368,600	1,434,241
1969	1,597,550	5,640,576	1,192,450	4,111,897	405,100	1,528,679
1970	1,443,050	4,797,652	992,900	3,223,701	450,150	1,573,951
1971	997,900	3,203,114	672,300	2,114,151	325,600	1,088,963
1972	1,018,700	3,173,016	714,450	2,191,564	304,250	981,452
1973	1,501,000	4,384,121	1,073,750	3,085,489	427,250	1,298,632
1974	2,030,550	4,971,095	1,445,850	3,509,345	584,700	1,461,750
1975	2,452,200	5,113,191	1,878,650	3,905,717	573,050	1,207,474
1976	2,059,650	3,959,201	1,482,100	2,861,197	557,550	1,098,004
1977	2,280,750	4,043,422	1,650,800	2,947,857	629,950	1,095,565
1978	3,013,450	4,755,982	2,188,500	3,484,873	824,950	1,271,109
1979	3,876,550	5,322,637	2,930,050	4,047,030	946,500	1,275,606
1980	4,691,750	5,504,903	3,680,800	4,325,264	1,010,950	1,179,638
1981	5,095,600	5,439,511	4,104,500	4,385,150	991,100	1,054,362
1982	3,604,400	3,604,400	2,894,750	2,894,750	709,650	709,650
1983	1,845,050	1,804,391	1,371,500	1,343,291	473,550	461,100
1984	2,285,850	2,183,238	1,606,500	1,534,384	679,350	648,854
1985	2,545,200	2,374,139	1,742,250	1,623,719	802,950	750,421
1986	2,578,500	2,357,845	1,890,300	1,724,726	688,200	633,119
1987(r)	2,323,650	2,079,149	1,676,500	1,488,899	647,150	587,250
1988(p)	2,399,100	2,069,585	1,574,550	1,341,184	824,550	728,401

(a) Shipment data not available for metal forming prior to 1956.

Source: U. S. Department of Labor, Bureau of Labor Statistics, NMTBA "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog (monthly)."

When converted to constant dollars, the apparent record shipments in recent years disappear. For the years shown above, the historical constant dollar average for metal cutting is $3,503,080 and for metal forming is $969,448.

2

WORLD ECONOMY

The tables in this chapter are intended to provide a perspective of the U.S. position in the world economy. The picture has changed dramatically in the past twenty years. The changes in the world's economic structure brought about by OPEC and the growth of many developing nations into newly industrialized powers have led to major shifts in the balance of economic power in the world. The rise to wealth of these developing nations has been accompanied by a substantial increase in world trade. Increasing specialization by these and the major industrial nations has created an environment of interdependence in which each nation is but a piece of the larger world economic puzzle.

Trends in growth rates in selected industrialized countries are presented in tables on Gross National Product, Real Gross National Product, and Industrial Production. Factors underlying these growth trends are found in the tables on international investment patterns and various tables of comparative prices, wages, productivity, and unit labor costs. The data and charts on cost recovery allowable for tax purposes on machinery and equipment in selected industrial countries are especially interesting. These graphically demonstrate how our industrial competitors are able to invest more than the average American firm, and by inference, they also demonstrate why the U.S. rate of productivity growth in recent years has been considerably lower than that of our major competitors.

Growth in the world economy and world trade has brought about a growing interest in the balance of payments positions of the various countries. A nation's balance of payments is considered a key indicator of the health or weakness of an individual economy. The same can be said for an industry trading in the world marketplace. In recent years disparate inflation rates, exchange rate movements, the phasing of national business cycles, and energy related problems have caused dislocations in many nations' and industries' balance of payments positions.

Since 1975, the overall United States balance of trade has moved from a small surplus to record deficits. Until 1978, the U.S. machine tool industry remained in surplus in its world trade position though the relative size of the surplus had been declining throughout the 1970's. Record high machine tool imports by U.S. manufacturers, combined with relatively small increases in machine tool exports, led to substantial balance of trade deficits in machine tool trade from 1978 through the present. In a little over a decade, the share of the domestic market represented by imports has grown from a negligible amount to over fifty percent of NC machine tool consumption and over forty percent of total U.S. machine tool consumption.

The tables in this chapter provide comparative international statistics on world trade, balance of trade, balance of payments and export prices.

GROSS DOMESTIC PRODUCT

1979 to Date

(Billions of U.S Dollars)

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
WORLD	$9,967	$11,041	$12,271	$13,058	$13,932	$15,008	$15,983	$16,800	NA	NA
Of which:										
United States	2,464	2,684	3,001	3,115	3,356	3,725	3,974	4,205	$4,497	$4,839
Canada	236	265	297	304	329	343	351	365	415	487
Korea	65	62	69	72	79	85	87	98	121	156
Japan	1,011	1,059	1,167	1,082	1,180	1,257	1,330	1,966	2,387	2,859
Australia	129	148	169	167	160	178	158	166	194	247
Belgium	111	120	99	87	86	78	82	115	142	153
France	583	665	582	552	526	499	553	727	882	943
West Germany	760	814	682	659	656	617	622	889	1,118	1,202
Italy	325	456	412	403	417	414	427	605	758	829
Netherlands	157	169	141	138	134	125	126	175	213	227
Spain	196	212	184	178	155	156	164	229	289	340
Sweden	108	124	113	100	92	96	100	131	159	179
Switzerland	95	102	94	97	97	91	93	135	171	185
United Kingdom	420	536	517	485	458	430	459	554	670	790
Saudi Arabia	74	116	154	153	120	106	90	75	71	NA
Brazil	201	253	266	271	205	211	229	280	326	352
Mexico	173	186	240	174	149	176	185	130	143	175
U.S.S.R.	1,396	1,540	1,723	1,867	1,902	2,073	2,154	2,285	2,375	NA
China	162	185	174	169	186	206	238	263	294	NA
PER CAPITA WORLD	$2,264	$2,467	$2,692	$2,817	$2,954	$3,127	$3,274	$3,382	NA	NA
of which:										
United States	10,950	11,787	13,043	13,396	14,293	15,717	16,609	17,406	$18,449	$19,646
Canada	9,945	11,062	12,199	12,333	13,227	13,665	13,825	14,233	16,161	18,813
Korea	1,719	1,637	1,783	1,840	1,969	2,109	2,114	2,365	2,883	3,728
Japan	8,725	9,071	9,919	9,139	9,894	10,473	11,014	16,180	19,553	23,275
Australia	8,857	10,090	11,357	10,967	10,412	11,412	10,014	10,366	11,914	14,942
Belgium	11,321	12,217	10,005	8,832	8,955	7,942	8,239	11,629	14,309	15,369
France	10,972	12,335	10,748	10,127	9,605	9,083	10,016	13,124	15,799	16,842
West Germany	12,390	13,242	11,056	10,683	10,680	10,084	10,190	14,567	18,273	19,640
Italy	5,777	8,080	7,287	7,116	7,339	7,267	7,477	10,577	13,219	14,423
Netherlands	11,201	11,957	9,924	9,653	9,340	8,640	8,709	12,050	14,541	15,412
Spain	5,288	5,642	4,873	4,690	4,061	4,076	4,255	5,924	7,432	8,702
Sweden	13,008	14,940	13,603	11,994	11,044	11,445	11,983	15,628	18,929	21,195
Switzerland	14,989	15,904	14,632	14,921	14,984	14,149	14,329	20,833	26,147	28,015
United Kingdom	7,516	9,577	9,168	8,611	8,583	7,605	8,098	9,756	11,770	13,850
Saudi Arabia	8,315	12,368	15,705	14,932	11,254	9,485	7,786	6,234	5,251	NA
Brazil	1,740	2,084	2,145	2,138	1,584	1,593	1,687	2,022	2,304	2,434
Mexico	2,564	2,685	3,363	2,375	1,985	2,287	2,349	1,632	1,725	2,096
U.S.S.R.	5,300	5,781	6,436	6,887	7,270	7,561	7,734	8,369	NA	NA
China	93	101	111	118	122	128	130	137	NA	NA

r - Revised. NA - Not Available.

(a) Data for the World, China, and U.S.S.R. series are GNP figures.

Note: GDP measures the total value of final output of a country's economy—that is, of the goods produced and services rendered within its territory by residents and nonresidents for a given period—without regard to its allocation among domestic and foreign claims.

Source: International Monetary Fund, Department of Commerce, Central Intelligence Agency.

INTERNATIONAL INVESTMENT PATTERNS
1979 to Date

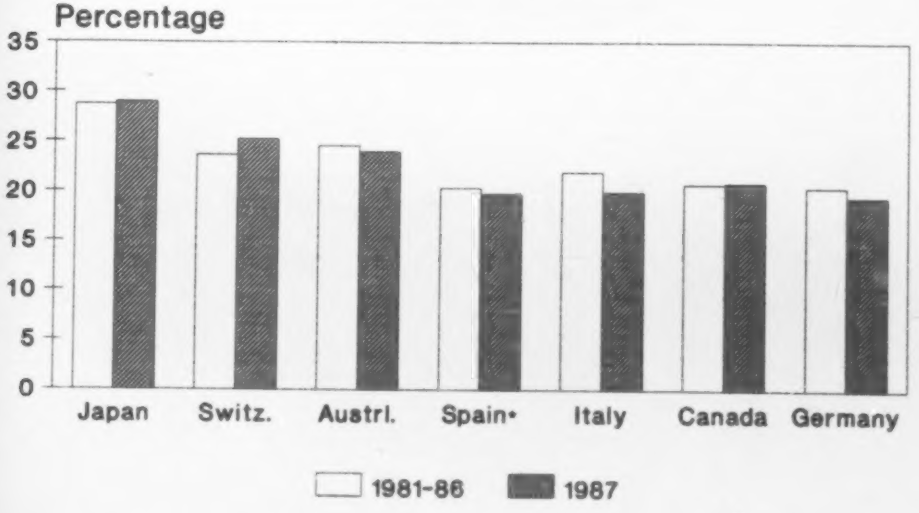
	Gross Fixed Capital Formation as Percent of GDP									
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
United States	20.4%	19.3%	18.8%	17.6%	17.1%	18.1%	18.4%	17.9%	17.2%	16.8%
Canada	23.0	23.3	24.2	21.8	20.0	19.0	19.7	20.0	20.8	NA
South Korea	32.6	31.2	27.5	29.3	30.3	30.2	29.7	30.4	30.7	NA
Japan	31.7	31.6	30.7	29.7	28.3	27.9	27.7	27.6	28.9	NA
Australia	23.3	24.2	25.9	25.8	23.3	23.1	24.7	24.4	23.9	NA
France	22.4	23.0	22.1	21.4	20.2	19.3	19.2	19.1	19.3	NA
West Germany	21.8	22.7	21.8	20.5	20.5	20.0	19.6	19.4	19.4	19.8
Italy	18.8	24.3	23.8	22.3	21.3	21.3	21.1	20.0	19.9	NA
Netherlands	21.1	21.1	19.2	18.2	18.2	18.6	19.2	20.1	20.2	21.2
Spain	18.9	19.4	21.8	21.3	20.6	19.0	19.2	19.7	NA	NA
Sweden	19.8	20.2	19.2	18.8	18.7	18.6	19.1	18.3	19.0	NA
Switzerland	21.8	23.8	24.1	23.1	23.3	23.3	23.8	24.2	25.2	NA
United Kingdom	18.7	18.1	16.2	16.2	16.1	17.1	17.0	16.9	16.9	NA

r - Revised. NA - Not Available.

Note: Fixed Capital Formation consists of non-residential structures and producers durable equipment as well as residential structures.

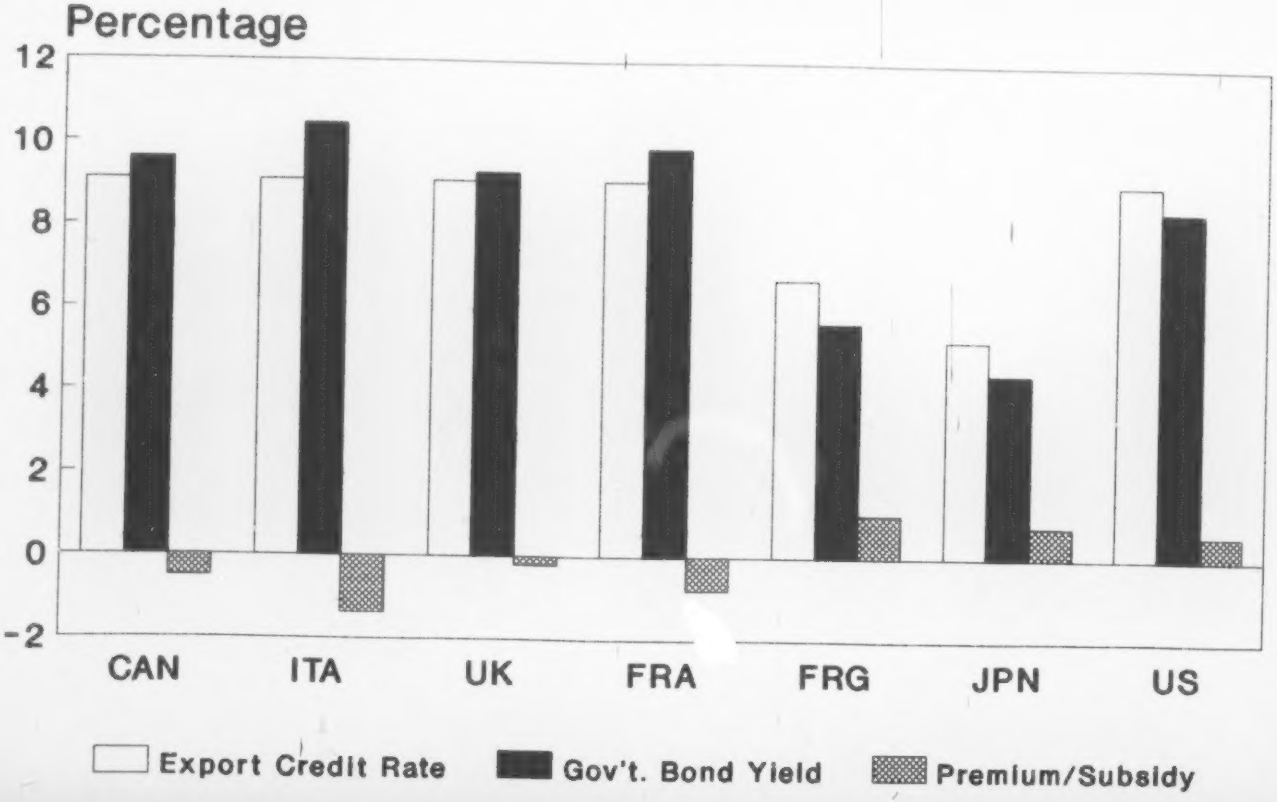
Source: International Monetary Fund, "International Financial Statistics."

INTERNATIONAL INVESTMENT PATTERNS
Fixed Capital Formation
as a Percent of GDP



•Spain data is through 1986.

1988
Long-term Interest Rate Concessions



U.S. DIRECT INVESTMENT (a) ABROAD BY MAJOR INDUSTRY AND COUNTRY— YEAR END 1987

(Billions of U.S. Dollars)

	Total	Petroleum	Manufacturing	Services	Other
Developed Countries	$233.3	$43.4	$104.8	$5.1	$80.2
Canada	56.9	11.9	25.8	0.9	18.3
Europe	149.0	25.8	67.5	3.8	52.0
European Community	122.2	19.1	64.9	3.0	35.2
France	11.5	0.5	8.4	0.1	2.5
Germany	24.5	3.3	16.0	Z	5.2
United Kingdom	44.7	11.0	18.3	1.2	14.2
Other EEC	41.6	4.2	22.3	1.7	13.4
Other Europe	26.7	6.7	2.6	0.7	16.7
Japan	14.3	2.6	7.1	0.2	4.5
Australia, New Zealand, South Africa	13.2	3.5	4.4	0.2	5.1
Developing Countries	71.2	19.1	21.9	1.7	28.5
Latin America	42.3	5.8	15.9	0.9	19.8
Other Africa (b)	5.1	4.2	0.3	0.1	0.5
Middle East (c)	4.8	2.8	0.4	0.5	1.0
Other Asia and Pacific	19.0	6.2	5.3	0.2	7.3
Other Countries	4.3	3.6	—	—	0.7
Total	$308,793	$66,381	$126,640	$6,812	$108,960

Z - Less than $50 million.

(a) Book value.
(b) Includes United Arab Republic (Egypt).
(c) Includes Bahrain, Iran, Israel, Jordan, Kuwait, Lebanon, Qatar, Saudi Arabia, South Yemen, Syria, United Arab Emirates, Oman and Yemen.

Note: Individual items may not add to totals due to rounding.

Source: U.S. Department of Commerce, "Survey of Current Business," August 1988.

INDUSTRIAL PRODUCTION (a)

(1985 = 100)

Year	United States	Canada	Japan	United Kingdom	France	West Germany	Italy	Sweden
1969	66.0	63.0	48.2	86.4	70	77	68.8	77
1970	64.0	64.1	54.9	86.5	74	81	74.7	82
1971	65.1	66.4	56.3	86.6	79	83	74.6	83
1972	71.0	71.4	60.4	88.5	83	86	77.9	85
1973	77.1	79.0	69.4	95.0	89	90	85.5	90
1974	76.8	81.5	66.6	91.3	91	88	89.3	95
1975	69.9	76.6	59.3	86.9	85	82	81.1	92
1976	77.4	81.4	66.0	88.7	92	89	91.1	92
1977	81.9	83.2	68.7	92.6	94	91	92.1	86
1978	86.7	85.4	73.0	95.6	96	93	92.0	85
1979	88.9	89.8	78.3	99.2	98	98	98.1	90
1980	87.3	90.6	82.0	92.5	99	98	103.6	90
1981	89.2	89.9	82.9	89.4	97	96	102.1	88
1982	82.8	78.6	85.0	91.3	97	93	98.9	87
1983	87.7	83.7	88.1	94.7	97	93	95.1	91
1984	97.8	90.8	96.4	94.9	99	96	98.7	98
1985	100.0	100.0	100.0	100.0	100	100	100.0	100
1986	99.4	100.4	99.7	102.2	100	102	102.7	100
1987	104.3	105.6	103.1	105.8	102	102	106.8	105
1988	110.2	111.8	112.8	109.7	106	106	111.1E	NA

E - Estimate. r - Revised. NA - Not Available.

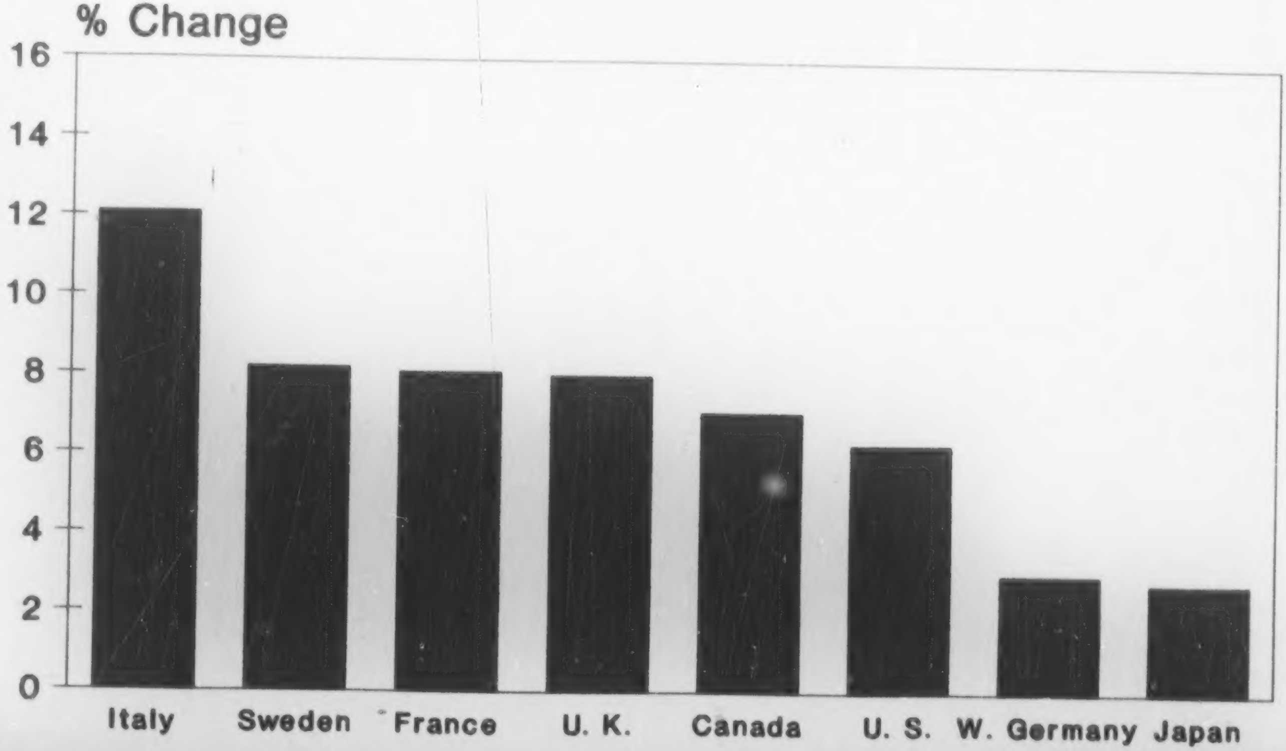
(a) Excludes construction.
(b) Data for the European Economic Community (EEC) on this table contains statistics for Belgium, Denmark, France, Ireland, Italy, Luxembourg, Netherlands, United Kingdom, and West Germany, and also includes Greece after 1980.

Source: International Monetary Fund, "International Financial Statistics," and NMTBA

CONSUMER PRICES

Average Annual Percent Change

1978-88



CONSUMER PRICES
(1985 = 100)

Year	United States	Canada	Japan	United Kingdom	France	West Germany	Italy	Sweden
1969	34.1	31.3	34.3	18.4	23.8	48.7	13.5	25.2
1970	36.1	32.2	36.9	19.6	25.3	50.3	14.2	26.9
1971	37.6	33.2	39.2	21.4	26.7	52.9	14.9	28.9
1972	38.9	34.8	40.9	23.0	28.3	55.9	15.8	30.7
1973	41.3	37.4	45.7	25.1	30.3	59.8	17.5	32.7
1974	45.8	41.5	56.9	29.0	34.5	64.0	20.8	36.0
1975	50.0	45.9	63.6	36.1	38.6	67.8	24.3	39.5
1976	53.0	49.4	69.5	42.1	42.3	70.7	28.4	43.6
1977	56.4	53.4	75.1	48.7	46.2	73.3	33.2	48.5
1978	60.7	58.2	78.0	52.8	50.3	75.3	37.3	53.3
1979	67.5	63.4	80.8	59.9	55.7	78.4	42.7	57.2
1980	76.6	69.9	87.3	70.6	63.3	82.6	51.8	65.0
1981	84.6	78.6	91.5	79.0	71.8	87.9	61.9	72.9
1982	89.7	87.1	94.1	85.8	80.3	92.5	72.1	79.2
1983	92.6	92.2	95.8	89.7	88.0	95.6	82.7	85.2
1984	96.6	96.2	98.0	94.3	94.6	97.9	91.6	93.1
1985	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1986	102.0	104.2	100.6	103.4	102.5	99.8	105.9	104.2
1987	105.7	108.7	100.7	107.8	105.9	100.1	110.9	108.6
1988	109.9	113.1	101.4	113.0	108.8	101.2	116.5	114.9

r - Revised.

Source: International Monetary Fund, "International Financial Statistics."

PRODUCER PRICES
(1985 = 100)

Year	United States	Canada(a)	Japan	United Kingdom(b)	France(c)	West Germany(d)	Italy	Sweden(e)
1969	34.6	30.0	46.9	18.8	26.5	47.5	12.8	23
1970	35.8	30.8	48.6	20.2	28.5	49.9	13.8	24
1971	36.9	31.3	48.2	22.0	29.1	52.0	14.3	25
1972	38.6	32.7	48.6	23.1	30.4	53.4	14.8	26
1973	43.6	36.4	56.3	24.8	34.9	56.9	17.4	29
1974	51.9	43.3	74.1	30.6	45.1	64.6	24.5	36
1975	56.7	48.2	76.3	37.4	42.5	67.5	26.5	39
1976	59.3	50.7	80.1	43.8	45.6	70.1	32.9	42
1977	62.9	54.6	81.6	51.6	48.2	71.9	38.3	46
1978	67.8	59.6	79.5	56.7	50.3	72.8	41.5	49
1979	76.2	68.2	85.3	62.9	57.0	76.3	47.9	56
1980	87.0	77.5	100.5	71.7	62.0	82.0	57.5	63
1981	95.0	85.3	101.9	78.6	68.8	88.4	67.5	70
1982	96.9	90.5	103.7	84.6	76.4	93.5	76.9	79
1983	98.1	93.6	101.4	89.2	84.9	94.9	84.4	88
1984	100.5	97.4	101.1	94.7	96.1	97.6	93.2	95
1985	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
1986	97.1	100.8	90.9	100.9	NA	97.5	99.1	97
1987	99.6	103.5	87.5	101.9	NA	95.1	101.7	100
1988	103.6	107.5	86.6	106.9	NA	96.3	106.5	105

NA - Not Available. r - Revised.

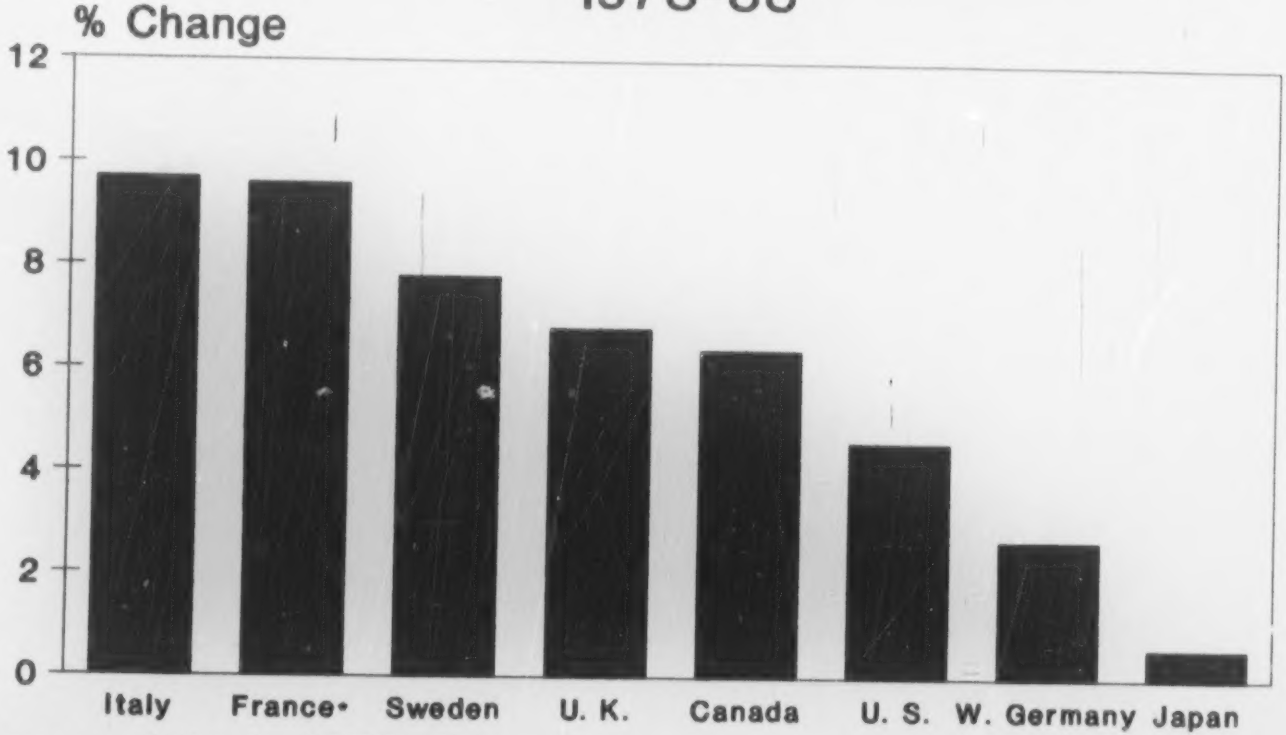
(a) Industrial selling prices.
(b) Manufacturing output prices.
(c) Industrial goods prices.
(d) Industrial products prices.
(e) Domestic supply prices.

Source: International Monetary Fund, "International Financial Statistics."

PRODUCER PRICES

Average Annual Percent Change

1978-88



*France data is 1978-85.

UNIT VALUE OF EXPORTS
(1985 = 100)

Year	United States	Canada	Japan	United Kingdom	France	West Germany	Italy	Sweden
1969	32.3	29.1	56.8	16.9	22.7	51.9	12.0	23
1970	34.0	29.9	59.4	18.5	25.1	50.1	12.5	25
1971	35.1	30.1	60.6	19.5	26.5	52.1	13.2	26
1972	36.3	31.1	59.8	20.6	26.8	53.6	13.5	27
1973	42.2	35.5	63.5	23.2	29.5	56.3	16.1	30
1974	53.9	47.0	85.2	29.7	37.2	65.6	22.7	38
1975	60.2	52.1	87.2	36.3	39.2	71.0	25.3	44
1976	62.3	53.3	86.7	43.4	42.8	69.4	30.8	46
1977	64.5	56.7	86.9	50.4	47.0	71.1	36.7	49
1978	69.0	62.2	82.0	55.2	49.4	71.8	39.4	52
1979	78.5	75.3	89.6	61.2	54.2	75.6	46.2	58
1980	89.1	87.6	99.8	69.9	60.1	82.8	55.7	66
1981	97.3	93.1	102.8	76.1	67.9	88.0	68.2	72
1982	98.4	93.9	108.2	81.5	77.5	91.8	78.6	81
1983	99.4	94.0	100.9	88.1	85.4	93.0	84.4	90
1984	100.8	98.3	100.8	95.1	95.5	96.3	92.5	97
1985	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100
1986	101.0	96.6	84.6	92.0	94.7	96.7	95.3	99
1987	102.7	97.3	79.5	96.0	94.1	94.2	96.4	102
1988	109.9	100.3	77.5	97.0	NA	94.5	100.4	105

NA - Not Available.

Source: International Monetary Fund, "International Financial Statistics."

SOVIET UNION FOREIGN TRADE (a)
1968 to 1987
(Millions of U.S. Dollars)

	Exports			Imports		
Year	Total	Communist Countries (b)	Non-communist Countries	Total	Communist Countries (b)	Non-communist Countries
1968	$10,634	$ 7,134	$ 3,500	$ 9,410	$ 6,367	$ 3,043
1969	11,655	7,682	3,973	10,327	6,696	3,631
1970	12,800	8,367	4,433	11,732	7,636	4,095
1971	15,918	10,398	4,788	14,388	9,432	4,302
1972	16,312	10,608	6,768	17,049	10,913	6,216
1973	21,175	12,215	8,978	20,825	12,351	8,442
1974	27,374	14,641	12,733	24,861	13,601	11,260
1975	33,407	20,271	13,136	37,072	19,415	17,657
1976	37,550	22,040	15,510	38,542	20,246	18,296
1977	45,094	25,901	19,193	40,806	23,284	17,521
1978	52,432	31,244	21,188	50,798	30,494	20,305
1979	64,913	36,152	28,761	57,961	32,801	25,160
1980	76,470	41,463	35,007	68,477	36,424	32,052
1981	78,809	43,044	35,764	72,631	36,905	35,727
1982	86,940	46,985	39,955	77,644	42,415	35,229
1983	91,653	50,914	40,739	80,440	45,484	34,957
1984	91,492	51,790	39,702	80,352	47,010	33,342
1985	86,400	52,800	33,600	82,400	50,300	32,100
1986	97,046	64,995	32,051	88,873	59,425	29,448
1987	76,454	50,234	26,220	70,578	48,747	21,831

(a) Exports and imports are F.O.B.

(b) Up to 1980, the following are included in the Communist Countries category: Albania, Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania, China, and Mongolian People's Republic. After 1980 the following are included in the category: Bulgaria, China, Cuba, Czechoslovakia, German Democratic Republic, Hungary, Korea, Laos, Mongolian People's Republic, Vietnam, and Yugoslavia.

Source: U.S. Department of Commerce "Overseas Business Reports," and U.S. Department of State

WORLD TRADE
(Billions of U.S. Dollars)

	1985		1986		1987		1988	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
World	$1,808	$1,880	$1,991	$2,059	$2,345	$2,417	$2,695	$2,792
Industrial Countries	1,262	1,348	1,473	1,524	1,720	1,802	1,969	2,042
United States(b)	219	352	227	383	255	424	322	460
Canada	91	81	90	85	98	93	117	115
Japan	177	130	211	128	231	151	265	187
United Kingdom	101	109	107	126	131	154	145	189
France	102	108	125	129	148	158	168	179
West Germany	184	158	243	191	294	228	323	251
Italy	77	88	98	99	116	125	129	139
Other industrial	311	322	372	383	447	469	500	522
Developing Countries	546	531	518	535	626	615	725	750
Africa	65	57	54	55	64	60	NA	NA
Asia	209	223	228	231	295	284	364	367
West Hemisphere	96	73	83	74	90	81	105	93
Middle East	114	104	87	96	105	100	NA	NA

NA - Not Available.

Source: International Monetary Fund, "International Financial Statistics."

U.S. TRADE WITH COMMUNIST COUNTRIES (a,c)
(Millions of U.S. Dollars)

	U.S. Exports			U.S. Imports		
	To Eastern Europe (b)	To USSR	To People's Republic of China	From Eastern Europe (b)	From USSR	From People's Republic of China
1969	$ 143.7	$ 105.5	Z	$ 144.0	$ 51.5	Z
1970	234.9	118.7	Z	153.5	72.3	Z
1971	222.2	162.0	Z	165.8	57.2	$ 4.9
1972	276.9	542.2	$ 63.5	225.0	95.5	32.4
1973	606.5	1,194.7	689.6	306.1	220.1	64.9
1974	823.4	609.2	807.4	539.4	350.4	114.7
1975	951.0	1,836.9	303.8	472.9	255.3	157.4
1976	1,189.7	2,305.9	135.4	646.2	220.6	201.9
1977	911.9	1,623.5	171.3	683.7	234.3	202.7
1978	1,420.2	2,249.0	818.2	969.8	540.4	324.0
1979	2,066.2	3,603.6	1,716.5	998.8	873.2	592.3
1980	2,339.8	1,509.7	3,749.0	982.0	452.9	1,058.3
1981	1,904.2	2,338.6	3,598.6	1,206.7	347.4	1,895.3
1982	1,012.8	2,583.7	2,912.1	839.4	227.6	2,283.7
1983	887.8	2,002.9	2,173.1	1,011.5	347.1	2,244.1
1984	903.9	3,283.9	3,004.3	1,599.4	600.1	3,064.8
1985	792.0	2,423.0	3,855.7	1,671.0	441.0	4,224.2
1986	737.0	1,248.0	3,106.0	1,596.0	605.0	5,241.0
1987	717.0	1,480.0	3,497.0	1,647.0	470.0	6,911.0
1988	797.6	2,767.6	5,038.8	1,413.2	649.1	9,269.8

Z - Less than $50,000.

(a) Data for 1978 to the present are not directly comparable to prior years due to commodity schedule changes.
(b) Does not include Yugoslavia.
(c) Exports and imports are f.a.s. transaction values, except prior to 1974, where imports are customs values.

Source: U.S. Department of Commerce; "Business America."

BALANCE OF TRADE AND PAYMENTS

1986 to Date

(Billions of U.S. Dollars)

	Balance of Trade (a)	Balance on Current Account (b)
United States (c)		
1986(r)	−144.5	−138.8
1987(r)	−160.3	−154.0
1988(p)	−126.3	−135.1
Canada		
1986(r)	7.6	−7.5
1987(r)	8.8	−8.0
1988(p)	8.5	−9.1
Japan		
1986(r)	92.8	85.8
1987(r)	96.5	87.0
1988(p)	94.7	79.3
United Kingdom		
1986(r)	−12.8	0.2
1987(r)	−16.7	−4.9
1988(p)	−36.5	−26.1
France		
1986(r)	−2.3	3.1
1987(r)	−9.2	−4.1
1988(p)	−8.3E	−1.6E
West Germany		
1986(r)	55.7	39.9
1987(r)	69.9	45.6
19[illegible](p)	78.6	48.6
Italy		
1986(r)	4.5	2.9
1987(r)	0	−1.1
1988(p)	−1.4E	−4.8E

p - Preliminary. r - revised. NA - Not Available.

(a) Balance of payments basis (exports f.o.b. less imports c.i.f.).
(b) Net exports of goods end services and unilateral transfers (OECD basis).
(c) Refer to Chapter 1 for historical chart of the United States balance of trade.

Source: International Monetary Fund, "International Financial Statistics."

HOURLY COMPENSATION FOR PRODUCTION WORKERS

All Manufacturing, By Country, 1983 and 1988

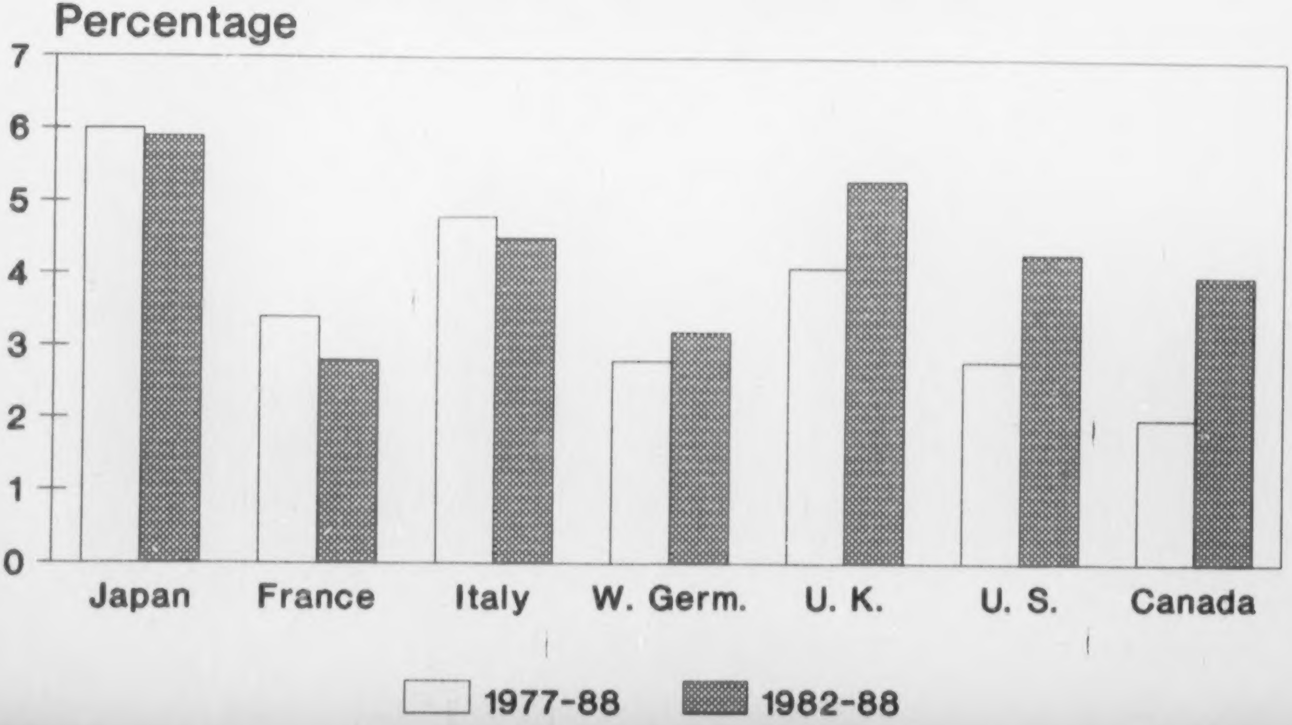
(U.S. Dollars)

	1983	1984	1985	1986	1987	1988
United States	$12.10	$12.51	$12.96	$13.21	$13.46	$13.92
Japan	6.13	6.34	6.47	9.47	11.14	12.72
West Germany	10.23	9.43	9.56	13.30	16.83	18.03
Italy	7.59	7.25	7.32	9.91	12.13	12.87
United Kingdom	6.39	5.95	6.19	7.54	8.97	10.49
France	7.74	7.29	7.52	10.27	12.42	12.96
Spain	4.64	4.58	4.79	6.43	7.86	8.78
Switzerland	10.46	9.64	9.66	13.76	17.08	18.08

Source: U.S. Bureau of Labor Statistics, Branch of International Comparisons

PRODUCTIVITY

Average Annual Increase in Output per Man-Hour in Manufacturing



PRODUCTIVITY IN MANUFACTURING (r)
Selected Countries, 1974 to Date
Indexes: 1977 = 100

	United States	Canada	Japan	France	West Germany	Italy	United Kingdom
Unit Labor Cost (a)							
1974	84.1	81.8	76.8	74.1	79.1	82.0	79.4
1975	91.7	93.1	86.7	98.5	88.7	106.8	102.5
1976	94.9	102.7	86.9	95.8	87.3	91.8	92.3
1977	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1978	106.6	99.3	126.8	117.9	121.0	112.4	126.5
1979	117.0	105.4	121.3	135.2	135.9	127.2	164.9
1980	130.6	121.5	116.8	156.4	147.9	138.4	220.6
1981	140.1	130.0	123.8	136.4	124.9	122.4	209.6
1982	148.7	146.3	108.8	124.9	119.7	118.4	186.8
1983	145.0	144.9	111.5	116.1	113.1	117.3	160.0
1984	142.2	133.2	107.2	108.1	102.6	105.9	142.9
1985	142.4	128.9	105.6	109.5	101.2	103.8	143.5
1986	143.3	132.1	154.4	146.3	143.0	137.4	168.6
1987	141.7	142.3	170.5	174.2	177.0	164.2	188.3
1988	142.1	157.8	188.4	172.9	180.3	168.8	210.5
Hourly Compensation (a)							
1974	76.2	75.0	66.4	63.4	69.1	73.2	77.0
1975	85.1	82.5	76.0	87.4	79.9	92.1	97.3
1976	92.1	97.3	81.9	90.4	84.2	89.8	91.4
1977	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1978	108.2	100.3	137.0	123.4	124.8	119.8	128.3
1979	118.6	107.6	139.2	148.3	147.0	148.2	169.0
1980	132.4	119.3	143.2	172.9	160.7	169.0	224.7
1981	145.2	133.9	157.6	155.4	138.5	153.4	224.4
1982	157.5	143.8	146.9	152.4	134.8	152.1	212.0
1983	162.4	152.8	158.6	145.2	134.8	158.7	196.9
1984	168.0	152.3	163.5	137.8	126.9	157.5	185.6
1985	176.9	151.3	170.1	145.3	129.9	162.8	192.4
1986	183.0	155.6	252.7	197.8	183.4	217.5	233.7
1987	186.9	171.5	301.0	238.3	230.0	266.2	277.9
1988	193.5	196.1	357.9	249.0	245.0	282.1	326.0
Output Per Man Hour (Productivity)							
1974	90.6	91.7	86.5	85.6	87.4	89.2	97.0
1975	92.9	88.6	87.7	88.7	90.1	86.2	94.9
1976	97.1	94.8	94.3	94.4	96.4	97.9	99.1
1977	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1978	101.5	101.1	108.0	104.6	103.1	106.5	101.4
1979	101.4	102.0	114.8	109.7	108.2	116.6	102.5
1980	101.4	98.2	122.7	110.6	108.6	122.1	101.9
1981	103.6	102.9	127.2	113.9	111.0	125.4	107.1
1982	105.9	98.3	135.0	122.0	112.6	128.5	113.5
1983	112.0	105.4	142.3	125.1	119.2	135.3	123.1
1984	118.1	114.4	152.5	127.5	123.7	148.8	129.9
1985	123.6	117.3	161.1	132.7	128.4	156.8	134.1
1986	127.7	117.7	163.7	135.2	128.3	158.3	138.6
1987	132.0	120.5	176.5	136.8	129.9	162.3	147.6
1988	136.2	124.3	190.0	144.1	135.9	167.1	154.9

r - Revised.

(a) U.S. dollar basis.

Source: U.S. Department of Labor, Bureau of Labor Statistics.

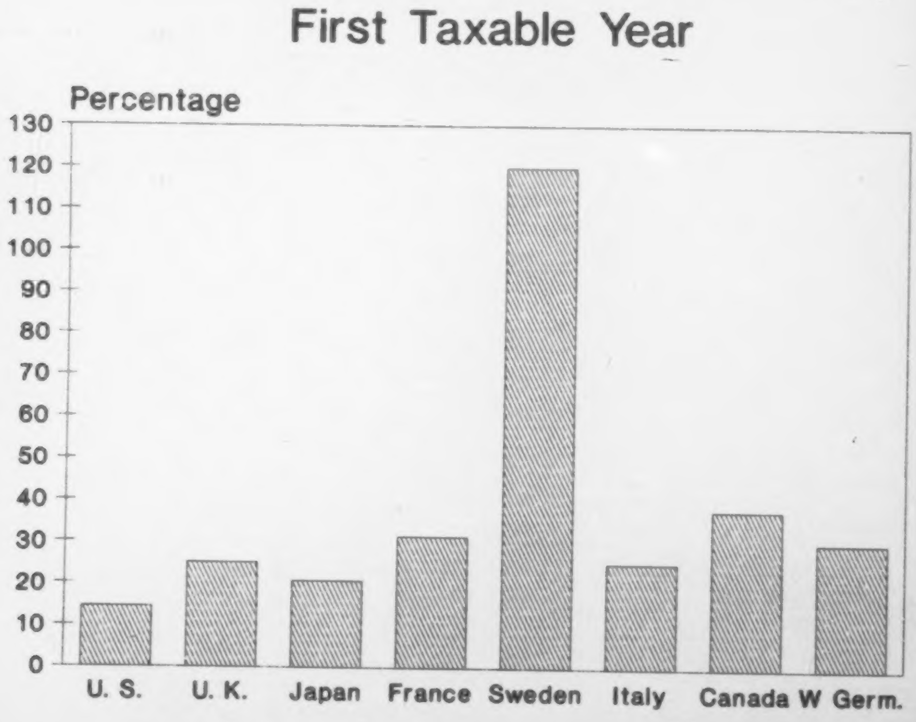
COST RECOVERY ALLOWABLE FOR TAX PURPOSES
ON MACHINERY AND EQUIPMENT, 1986
(Percent of Original Cost)

Country	Recovery Period (Years)	First Year	Third Year	Seventh Year
United States	7	14.3%	56.3%	95.5%
United Kingdom	11	25.0	57.0	86.7
Japan	10	20.6	50.0	80.1
France	8	31.3	67.4	94.9
Sweden	1	120.0	120.0	120.0
Italy	6	25.0	75.0	100.0
Belgium	7	33.0	61.8	102.0
Canada	3	37.7	107.4	107.4
Netherlands	8	44.4	69.4	119.4
West Germany	10	30.0	65.7	91.7
Australia	5	20.0	60.0	100.0

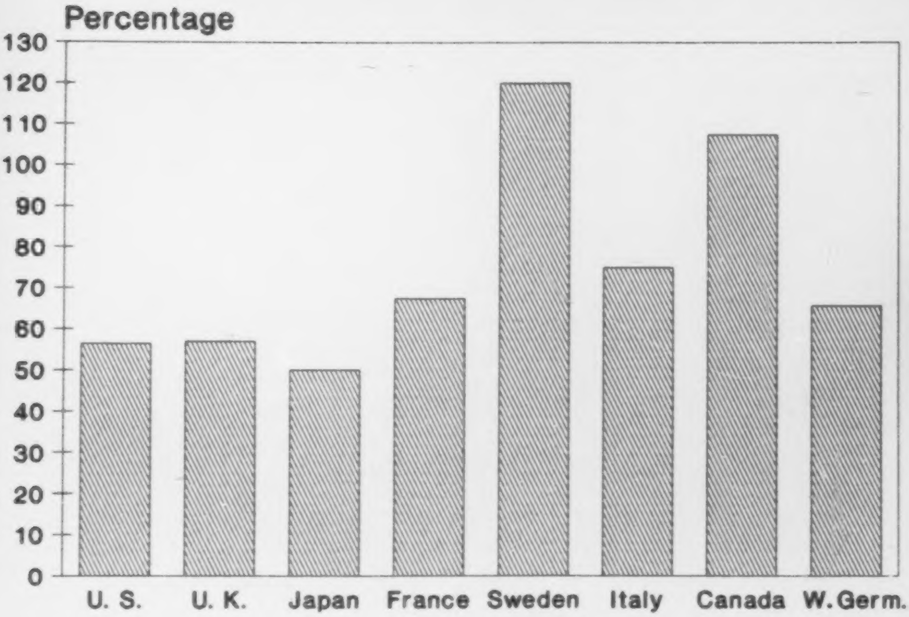
Note: These capital cost recovery allowances are based on current statutory or other published provisions of law. As such they do not reflect the informal or ad hoc arrangements that are frequently available in foreign countries to increase the rate of cost recovery actually allowed to industrial producers.

Source: Report of the President's Task Force on Business Taxation, September 1970, pages 28-29 updated by Price Waterhouse & Company. The most recent data is for the year 1986.

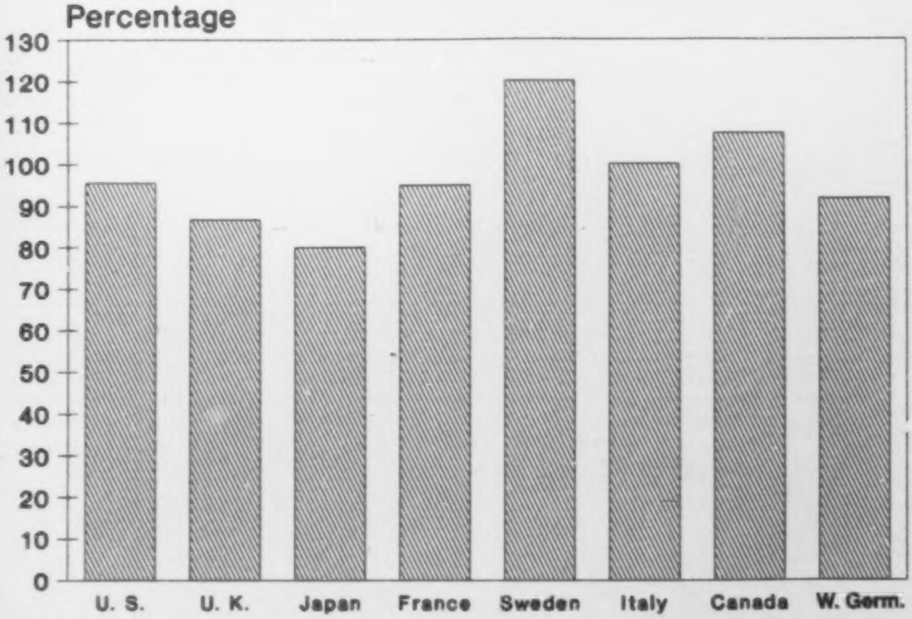
Cost recovery allowable for tax purposes includes depreciation as well as any tax credits. Where credits are available, total allowable cost recovery can exceed 100% of the original purchase cost. The rate of depreciation determines how quickly these costs are recovered. The percent values as stated are based on accelerated depreciation rates applicable in each country on a "typical" piece of capital equipment. At the end of the depreciation period, the taxable profits of the enterprise will have been reduced by the allowable cost recovery. The actual tax savings will depend on the tax rate prevailing in the specific country.



Third Taxable Year



Seventh Taxable Year



FEDERAL, STATE AND LOCAL TAX REVENUES AS PERCENT OF GNP, 1985 (r)

Selected Countries

Country	Total	Sales & Excise (a)	Social Security Total (b)	Corporate Income	Non-Corporate Income (c)	Other (d)
Belgium	46.9%	10.7%	15.5%	3.0%	16.0%	1.7%
Canada	34.4	8.9	4.6	2.8	12.2	5.9
Denmark	51.3	16.9	2.0	2.5	25.8	4.2
France	44.5	12.8	19.4	1.9	5.7	4.8
Italy	41.2	9.7	14.3	3.8	11.0	2.3
Japan	30.7	3.7	9.3	6.5	7.6	3.6
Luxembourg	41.5	9.7	11.0	7.5	10.9	2.4
Netherlands	44.6	10.5	19.6	3.1	8.7	2.7
Sweden	51.9	13.2	12.9	1.8	20.0	4.1
Switzerland	30.3	5.3	9.7	1.8	10.5	2.9
Turkey	38.5	16.8	2.0	4.5	13.0	2.3
United Kingdom	37.6	11.2	6.6	4.9	9.8	5.2
United States	28.3	4.3	8.3	2.0	10.1	3.5
West Germany	37.7	9.2	13.8	2.3	10.8	1.6

r - revised.

(a) Includes general sales, value added, and specific excise taxes.
(b) Includes contributions of employers, employees, and self-employed.
(c) Includes income taxes on individual and unincorporated enterprise.
(d) Includes taxes on net wealth and immovable property, taxes and stamp duties on gifts, inheritances, etc.

Source: "Revenue Statistics of OECD Member Countries," (Annual).

SOCIAL SECURITY TAX REVENUES AS PERCENT OF GNP, 1985 (r)

Selected Countries

Country	Total (a)	Employees	Employers	Self-Employed and Other
Belgium	15.5%	6.0%	8.3%	1.3%
Canada	4.6	1.6	2.9	0.1
Denmark	2.0	1.0	1.0	0.0
France	19.4	5.4	12.6	1.4
Italy	14.3	2.8	10.2	1.3
Japan	9.3	3.3	4.7	1.2
Luxembourg	11.0	4.3	5.7	1.0
Netherlands	19.6	8.5	7.8	3.3
Sweden	12.9	0.0	12.3	0.6
Switzerland	9.7	3.1	3.0	3.6
Turkey	2.0	0.5	1.4	0.0
United Kingdom	6.6	3.0	3.3	0.2
United States	8.3	3.2	4.9	0.3
West Germany	13.8	6.0	7.1	0.7

r - revised.

(a) The category is broadly defined to include all tax payments to institutions of general government providing social welfare benefits, provided they are levied as a function of pay or as a fixed amount per person. Thus, for the United States, this category includes contributions to the railroad retirement fund, unemployment insurance fund, workmen's compensation fund, and civil service retirement program in addition, of course, to the more familiar social security payments made pursuant to the Federal Insurance Contributions Act (FICA).

Source: "Revenue Statistics of OECD Member Countries," (Annual).

3

U. S. MACHINE TOOL INDUSTRY

The "Machine Tool Industry" actually consists of two industries according to the government's Standard Industrial Classification system (SIC); Metal Cutting Machine Tools (SIC 3541) and Metal Forming Machine Tools (SIC 3542).

The distinction between "industries" and "products" should be clearly kept in mind to avoid confusion in studying the statistical data in this Handbook. In brief, the machine tool industry produces not only machine tools but other products. The reverse of this is also true—not all machine tools are produced by the machine tool industry—some other industries also produce machine tools.

The machine tool industry is made up of the establishments whose "primary products" are machine tools. Data on shipments by the machine tool industry covers the totality of the shipments of the establishments in the industry. This means that not only the machine tools but also "secondary products"—products that are generally produced by other industries—are covered. Such secondary products may be tooling, machine tool accessories, abrasive products, wood- or plastic-working machines, or a variety of other products.

To measure the degree to which an industry produces its primary and secondary products, the Census Bureau has developed a "primary specialization ratio" which describes the proportion of total product shipments that are "primary products." For the metal cutting industry this specialization ratio was 91% for 1982. This means that 91% of the products shipped by this industry were metal cutting machine tools and 9% were products other than metal cutting machine tools. For metal forming, the corresponding figures are 89% and 11%.

The Bureau of the Census reports not only "industry" totals but also "product" totals. To obtain a product total, it adds to the machine tools produced by the machine tool industry all the machine tools produced by other industries as secondary products.

In addition to the industry specialization ratio described above, the Census has developed a ratio to describe the proportion of primary products produced by the establishments classified in the industry to total shipments of such products by all manufacturing establishments. This ratio is called the "coverage ratio." In 1982, the coverage ratio in metal cutting was 93%, in metal forming 87%. This means that the metal cutting industry produced 93% of all metal cutting machine tools produced in the U.S., the metal forming industry 87% of all American metal forming machine tools.

The data in Chapter 3 deal exclusively with the machine tool INDUSTRY. Chapter 4 deals with PRODUCTS—total machine tool orders and shipments. As already indicated, industry data are based on the Standard Industrial Classification system. This system was developed to classify establishments by type of activity—it covers the entire field of economic activities. The system is structured by digits. The first two digits identify the major industry group, the third digit identifies the industry group, and the fourth digit identifies the industry. The Bureau of the Census adds additional digits to define products, e.g., a fifth to define product classes and sixth and seventh digits to specify individual products. Below is an illustration for machine tools:

Industries	Major Group 35:	Machinery, Except Electrical
	Group 354:	Metalworking Machinery, and Equipment
	Industry 3541:	Machine Tools, Metal Cutting Types
Products	Product Class 35413:	Gear Cutting Machines
	Product 3541371:	Gear Tooth Finishing Machines

Size of the Industry

The machine tool industry is relatively small compared to other U.S. industries. Many of the larger industrial corporations have more employees and a higher value of product shipments than the entire machine tool industry. If all of the machine tool industry were combined into one firm, its sales would rank 151st on the 1987 "Fortune 500" listing of America's largest manufacturing companies.

While the most recent Census of Manufacturers (1982) reports almost 1,400 establishments in SIC 3541 and SIC 3542, estimates by the NMTBA and Census Bureau indicate that approximately 40% of these plants primarily manufacture machine tool accessories, dies, tools, jigs and fixtures rather than machine tools. According to the 1982 Census, two-thirds of these establishments had fewer than 20 employees.

Location of the Industry

During the 19th century, the machine tool industry was located almost entirely in New England. Its center moved southward into the Middle Atlantic States and Pennsylvania and then west into Ohio and other parts of the Middle West as the 1800's drew to a close. Development and growth were closely related to the growth of other industries such as textile machinery, small arms, watches and clocks, ships, railroads, farm machinery, and bicycles. By 1900, Cincinnati had become the leading machine tool center, Philadelphia was second, Providence, R.I., third. In the 1920's the rapid growth of the automobile industry accounted for the rapid growth of machine tool production in Michigan and Illinois. The decline of Pennsylvania as a machine tool producer was closely related to the decline of the locomotive. Today, the leading metal cutting machine tool producing states are Ohio, Michigan, Illinois, Connecticut, New York, and Wisconsin, and the leading metal forming machine tool producers are Illinois, Ohio, Michigan, New York, and Connecticut.

Sources of Industry Data

Data on the machine tool industry comes from the Census of Manufacturers (which takes place every five years) and the Annual Survey of Manufacturers. The Census is based on reports from individual establishments and is very detailed. However, the Census suffers from several shortcomings. It focuses primarily on large establishments, thus data on smaller establishments are less reliable. Much of the data published for smaller firms is actually not the product of either the Census or the Annual Surveys. Instead, most of the data for firms with fewer than twenty employees is estimated from administrative records on payroll and sales supplied to the Census Bureau by other government agencies. It is often the case that over ninety percent of the data on small firms is the product of these administrative record based estimates.

A second problem with the Census is that it is published with a considerable time lag. Because 1982 was a Census year and because of the time lag in the publication of the Census data, many of the charts and tables in this chapter were previously published using preliminary Census statistics. The final Census data were published in early 1985 and all charts and tables citing the Census have been revised to reflect these final statistics.

In general, the industry finds that its own data, and those released quarterly by the government as "Current Industrial Reports" (MQ-35W), are more useful and timely. The main value of the 5-year Census lies in the broader coverage and in the fact that shipment, employment, compensation, and other data are all available for the same population. This permits the calculation of ratios otherwise not available. The Annual Survey of Manufacturers is based on sample surveys and covers fewer items than the Census. It is also published with a considerable delay between the time of data collection and distribution.

THE MACHINE TOOL INDUSTRY (a)

General Statistics, 1958 to 1987

Year	Establishments Total	Establishments With 20 or More Employees	Employees (Number)	Value Added by Manufacture (Millions of Dollars)	Cost of Materials (Millions of Dollars)	Value of Shipments (Millions of Dollars)
TOTAL INDUSTRY, SIC 3541 and 3542						
1958	918	378	75,366	$ 597.0	$ 347.8	$ 997.5
1959	NA	NA	75,091	737.4	403.3	1,111.5
1960	NA	NA	81,200	815.8	468.7	1,265.7
1961	NA	NA	78,108	771.8	456.4	1,241.9
1962	NA	NA	82,251	936.8	513.7	1,430.3
1963	1,167	415	83,136	980.6	547.0	1,502.2
1964	NA	NA	88,079	1,154.7	678.7	1,790.7
1965	NA	NA	96,344	1,342.6	813.5	2,107.2
1966	NA	NA	108,174	1,666.3	981.3	2,553.8
1967	1,253	506	116,400	1,828.5	1,062.3	2,841.2
1968	NA	NA	112,200	1,830.4	988.9	2,817.3
1969	NA	NA	110,600	1,894.6	1,034.7	2,834.8
1970	NA	NA	100,200	1,581.7	992.6	2,597.8
1971	NA	NA	78,400	1,183.7	751.2	2,018.8
1972	1,277	437	76,600	1,319.4	821.6	2,114.4
1973	NA	NA	86,900	1,760.6	1,134.9	2,777.3
1974	NA	NA	94,000	2,250.7	1,523.3	3,579.8
1975	NA	NA	88,800	2,258.6	1,533.5	3,834.4
1976	NA	NA	81,000	2,285.2	1,286.2	3,566.9
1977	1,343	469	83,100	2,598.0	1,491.7	3,943.3
1978	NA	NA	89,500	3,108.3	1,994.1	4,977.8
1979	NA	NA	96,100	3,837.8	2,423.9	6,052.5
1980	NA	NA	99,700	4,391.3	2,744.6	6,980.7
1981	NA	NA	98,300	4,716.4	2,850.0	7,481.0
1982	1,394	455	77,800	3,294.0	2,172.9	5,840.2
1983	NA	NA	58,300	2,242.3	1,554.9	4,023.2
1984	NA	NA	58,500	2,595.9	1,904.9	4,520.3
1985	NA	NA	60,500	2,933.2	2,070.3	4,789.8
1986	NA	NA	55,200	2,589.5	2,251.2	4,964.0
1987	652	371	46,400	2,420.4	2,070.1	4,658.8

NA - Not available.

(a) The machine tool industry (Standard Industrial Classification SIC 3541 and 3542) produces primarily metal cutting and metal forming machine tools. It also produces other (secondary) products, such as small cutting tools, attachments and accessories and others. These secondary products as well as machine tool parts and some other items are included in this table. It therefore differs from other Census and NMTBA data on shipments of machine tools.

Sources: U.S. Bureau of the Census, "Census of Manufacturers, 1963, 1967, 1972, 1977; 1982, 1987 Metalworking Machinery and Equipment" and "Annual Survey of Manufacturers."

THE MACHINE TOOL INDUSTRY (a)

General Statistics, 1967 to 1987

Metal Cutting and Metal Forming

Year	Establishment		Employees (Number)	Value Added by Manufacture	Cost of Materials	Value of Shipments
	Total	With 20 or More Employees		(Millions of Dollars)		
METAL CUTTING MACHINE TOOL INDUSTRY, SIC 3541						
1967	903	338	87,200	$1,391.3	$ 786.9	$2,127.2
1968	NA	NA	84,300	1,377.1	718.9	2,089.1
1969	NA	NA	82,600	1,441.5	744.5	2,108.3
1970	NA	NA	71,300	1,112.1	664.0	1,821.7
1971	NA	NA	54,000	819.8	473.2	1,351.1
1972	894	275	52,500	901.7	536.3	1,418.1
1973	NA	NA	59,900	1,214.1	764.1	1,891.1
1974	NA	NA	65,000	1,617.0	1,017.9	2,480.5
1975	NA	NA	62,800	1,640.3	1,050.3	2,727.8
1976	NA	NA	58,100	1,664.1	852.3	2,496.2
1977	917	306	59,400	1,866.1	1,047.7	2,812.7
1978	NA	NA	64,300	2,267.0	1,417.7	3,611.8
1979	NA	NA	69,100	2,833.8	1,736.9	4,389.0
1980	NA	NA	72,800	3,349.2	2,026.1	5,227.6
1981	NA	NA	74,300	3,739.9	2,187.3	5,865.3
1982	942	293	58,300	2,516.2	1,598.3	4,411.5
1983	NA	NA	43,000	1,612.7	1,100.0	2,880.9
1984	NA	NA	42,400	1,820.0	1,369.5	3,211.6
1985	NA	NA	42,800	2,000.0	1,471.6	3,377.0
1986	NA	NA	38,600	1,823.8	1,538.0	3,456.1
1987	435	245	32,400	1,698.7	1,423.7	3,242.6
METAL FORMING MACHINE TOOL INDUSTRY, SIC 3542						
1967	350	168	29,200	$ 437.2	$ 295.4	$ 714.0
1968	NA	NA	27,900	453.3	270.0	718.2
1969	NA	NA	28,000	453.1	290.2	726.5
1970	NA	NA	28,900	469.6	328.6	776.1
1971	NA	NA	24,400	363.9	278.0	667.7
1972	383	162	24,100	417.7	285.3	696.3
1973	NA	NA	27,000	546.5	370.8	886.2
1974	NA	NA	29,000	633.7	505.4	1,099.3
1975	NA	NA	26,000	618.3	483.2	1,106.6
1976	NA	NA	22,900	621.1	433.9	1,070.7
1977	426	163	23,700	721.9	444.0	1,130.6
1978	NA	NA	25,200	841.3	576.4	1,386.0
1979	NA	NA	27,000	1,004.0	687.0	1,663.5
1980	NA	NA	26,900	1,042.1	718.5	1,753.1
1981	NA	NA	24,000	976.5	662.7	1,615.7
1982	452	162	19,500	777.8	574.6	1,428.7
1983	NA	NA	15,300	629.6	454.9	1,142.3
1984	NA	NA	16,100	775.9	535.4	1,308.7
1985	NA	NA	17,700	933.2	598.7	1,412.8
1986	NA	NA	16,600	765.7	713.2	1,507.9
1987	217	126	14,000	721.7	646.4	1,415.2

NA - Not Available.

(a) The machine tool industry (Standard Industrial Classifications SIC 3541 and 3542) produces primarily metal cutting and metal forming machine tools. It also produces other (secondary) products, such as small cutting tools, attachments and accessories and others. These secondary products as well as machine tool parts and some other items are included in this table. It therefore differs from other Census and NMTBA data on shipments of machine tools.

Sources: U.S. Bureau of the Census, "Census of Manufacturers, 1963, 1967, 1972, 1977, 1982, 1987 Metalworking Machinery and Equipment" and "Annual Survey of Manufacturers."

LOCATION OF THE MACHINE TOOL INDUSTRY (c)
Establishments, Employees, Value Added, Shipments, By Region
For Selected Years, 1963 to 1982

Region	Establishments		Employees	Value Added by Manufacture	Value of Shipments
	Total	With 20 or More Employees	(Number)	(Million Dollars)	
U.S. TOTAL					
1963	1,167	415	83,136	$ 980	$1,502
1967	1,253	506	116,400	1,828	2,841
1972	1,277	437	76,600	1,319	2,114
1977	1,343	469	83,200	2,593	3,950
1982	1,392	455	77,600	3,332	5,889
NEW ENGLAND					
1963	150	52	16,934	183	273
1967	149	68	25,300	386	550
1972	140	52	2,000(a)	32(a)	48(a)
1977	155	56	D	56(a)	D
1982(d)	166	53	14,590E	D	D
MIDDLE ATLANTIC					
1963	251	68	11,618	148	212
1967	236	71	13,400	215	299
1972	218	64	10,400	175	270
1977	197	57	7,000(b)	205(b)	286(b)
1982(d)	178	53	12,100E	280(b)	424(b)
EAST NORTH CENTRAL					
1963	545	239	49,415	592	926
1967	578	270	67,500	1,100	1,764
1972	620	240	45,500	793	1,308
1977	595	252	48,200	1,535	2,389
1982(d)	565	228	39,200E	D	D
WEST NORTH CENTRAL					
1963	44	16	1,085	11	16
1967	46	22	2,600	38	57
1972	50	25	2,400	43	65
1977	52	23	D	D	D
1982(d)	104	37	6,810E	D	D
SOUTH					
1963	47	12	1,068	13	19
1967	61	29	3,200	44	63
1972	82	21	1,000(a)	19(a)	30(a)
1977	40	12	975E	5(b)	7(b)
1982(d)	71	22	1,630E	D	D
WEST					
1963	130	28	3,016	35	55
1967	180	46	4,400	67	109
1972	168	36	2,000(a)	39(a)	64(a)
1977	162	40	3,000E	65(b)	96(b)
1982(d)	165	32	2,910E	57(b)	100(b)

D - Withheld to avoid disclosure. E - Estimate.

(a) Includes metal forming data only, metal cutting data withheld to avoid disclosure.

(b) Includes metal cutting data only, metal forming data withheld to avoid disclosure.

(c) Due to a change of methodology at the Bureau of Census some States' data are withheld, therefore regional data may not add to U.S. Total.

(d) The regional data includes states with 150 employees or more.

Source: U.S. Bureau of the Census, "Census of Manufactures, 1982 Industry Series: Metalworking Machinery and Equipment, MC82-1-35C" and earlier issues. See chapter introduction.

LOCATION OF THE METAL CUTTING MACHINE TOOL INDUSTRY (a)

General Statistics by Region

For Selected Years, 1963 to 1982

Region	Establishments		Employees	Value Added by Manufacture	Value of Shipments
	Total	With 20 or More Employees	Employees (Number)	(Million Dollars)	
U.S. TOTAL					
1963	801	289	61,058	$ 699	$1,061
1967	903	338	97,200	1,391	2,127
1972	804	275	52,500	902	1,418
1977	919	307	59,500	1,871	2,819
1982	940	293	58,100	2,555	4,440
NEW ENGLAND					
1963	111	38	14,853	160	236
1967	120	51	22,900	329	492
1972	109	40	D	D	D
1977	122	44	D	D	D
1982(b)	129	42	13,680E	D	D
MIDDLE ATLANTIC					
1963	163	40	7,106	89	120
1967	163	44	8,100	145	189
1972	145	35	6,500	115	166
1977	125	33	7,000	205	286
1982(b)	103	30	7,400	280	424
EAST NORTH CENTRAL					
1963	387	161	36,845E	425	682
1967	428	191	49,900	824	1,303
1972	438	154	31,000	538	875
1977	440	175	34,600	1,105	1,717
1982(b)	397	156	28,300E	D	D
WEST NORTH CENTRAL					
1963	24	11	547	5	8
1967	26	10	1,600	25	36
1972	29	13	1,500	27	41
1977	28	13	D	D	D
1982(b)	83	28	5,710E	D	D
SOUTH					
1963	26	4	463	6	9
1967	37	15	2,200	31	41
1972	52	12	D	D	D
1977	17	2	200	5	7
1982(b)	63	17	1,410E	D	D
WEST					
1963	90	14	1,244	15	24
1967	129	27	2,500	38	66
1972	121	21	D	D	D
1977	104	18	1,700	65	96
1982(b)	111	14	1,600	57	100

D - Withheld to avoid disclosure. E - Estimate.

(a) Due to a change in methodology at the Bureau of Census some States' data are withheld, therefore regional data may not add to U.S. Total.

(b) The regional data includes states with 150 employees or more.

Source: U.S. Bureau of the Census, "Census of Manufactures, 1982 Industry Series: Metalworking Machinery and Equipment, MC82-1-35C" and earlier issues. See chapter introduction.

LOCATION OF THE METAL FORMING MACHINE TOOL INDUSTRY (a)

General Statistics by Region
For Selected Years, 1963 to 1982

Region	Establishments		Employees (Number)	Value Added by Manufacture	Value of Shipments
	Total	With 20 or More Employees		(Million Dollars)	
U.S. Total					
1963	366	146	22,078	$ 281	$ 441
1967	350	166	29,200	437	714
1972	383	162	24,100	418	696
1977	426	163	23,700	722	1,131
1982	452	162	19,500	778	1,429
NEW ENGLAND					
1963	39	13	2,081	23	35
1967	29	17	2,400	37	58
1972	31	12	2,000	32	48
1977	33	12	D	56	D
1982(b)	37	11	910E	D	D
MIDDLE ATLANTIC					
1963	86	28	4,512	59	92
1967	76	27	5,300	70	110
1972	73	29	3,900	60	104
1977	72	24	D	D	D
1982(b)	75	23	4,700E	D	D
EAST NORTH CENTRAL					
1963	158	78	12,570	167	264
1967	150	79	17,600	276	461
1972	182	86	14,500	256	433
1977	155	73	13,600	430	672
1982(b)	168	72	10,900E	D	D
WEST NORTH CENTRAL					
1963	20	5	536	6	8
1967	20	12	1,000	13	21
1972	21	12	900	16	24
1977	24	10	D	D	D
1982(b)	21	9	1,100E	D	D
SOUTH					
1963	21	8	605	7	10
1967	24	14	1,000	13	22
1972	30	9	1,000	19	30
1977	23	10	955E	D	D
1982(b)	8	5	220E	D	D
WEST					
1963	40	14	1,772	20	31
1967	51	19	1,900	29	43
1972	47	15	2,000	39	64
1977	58	22	1,300E	D	D
1982(b)	54	18	1,300E	D	D

D - Withheld to avoid disclosure. E - Estimate.

(a) Due to a change in methodology at the Bureau of Census some States' data are withheld, therefore regional data may not add to U.S. Total.

(b) The regional data includes states with 150 employees or more.

Source: U.S. Bureau of the Census, "Census of Manufactures, 1982 Industry Series: Metalworking Machinery and Equipment, MC82-1-35(C)" and earlier issues. See chapter introduction.

LOCATION OF THE METAL CUTTING MACHINE TOOL INDUSTRY
General Statistics by Region
1977 to 1982

	Establishments			Value Added by Manufacture	Value of Shipments
	Total	With 20 or More Employees	Employees (Number)	(Million Dollars)	
STATE			1977		
California	95	16	1,500	$ 60	$ 89
Connecticut	46	18	4,600	148	234
Illinois	94	39	6,500	196	291
Indiana	25	8	1,400	39	57
Iowa	6	4	500	12	21
Massachusetts	37	10	2,200	66	92
Michigan	190	74	9,200	358	566
Minnesota	20	7	1,300	40	58
New Jersey	31	6	400	10	15
New York	52	16	4,700	148	204
Ohio	95	40	13,900	389	624
Pennsylvania	42	11	1,900	48	66
Rhode Island	20	7	2,400	62	82
Texas	17	2	200	5	7
Vermont	6	4	2,800	87	117
Washington	9	2	200	5	7
Wisconsin	36	18	3,700	128	180
STATE			1982(d)		
California	93	12	1,400	$ 50	$ 88
Connecticut	61	17	5,100	180	326
Florida	20	2	200	5	9
Illinois	90	30	5,400	208	358
Indiana	22	4	1,300	36	83
Iowa	4	2	(b)	D	D
Kansas	7	2	(b)	D	D
Kentucky	7	4	(b)	D	D
Maine	6	2	(b)	D	D
Massachusetts	35	11	2,600	114	176
Michigan	203	83	8,900	491	1,056
Minnesota	24	6	1,200	49	73
Missouri	7	1	200	3	8
New Hampshire	5	3	(c)	D	D
New Jersey	27	4	400	17	28
New York	42	14	4,900	176	275
North Carolina	8	4	200	8	22
Ohio	75	35	12,300	547	934
Pennsylvania	34	12	2,100	86	121
Rhode Island	16	5	(c)	D	D
South Carolina	5	2	(a)	D	D
South Dakota	3	2	(a)	D	D
Tennessee	3	1	(a)	D	D
Texas	22	6	(b)	D	D
Vermont	6	4	2,600	91	153
Virginia	5	2	(b)	D	D
Washington	18	2	200	7	12
Wisconsin	38	15	3,400	255	375

D – Withheld to avoid disclosure.

(a) 150 – 249 Employees.
(b) 250 – 499 Employees.
(c) 1,000 – 2,499 Employees.
(d) Data includes only states with 150 machine tool employees or more.

Source: U.S. Bureau of the Census, "Census of Manufactures 1977, 1982 Industry Series: Metalworking Machinery and Equipment, MC82–1–35C" and earlier issues. See chapter introduction.

LOCATION OF THE METAL FORMING MACHINE TOOL INDUSTRY

General Statistics by Region
1977 to 1982

	Establishments			Value Added by Manufacture	Value of Shipments
	Total	With 20 or More Employees	Employees (Number)	(Million Dollars)	
STATE			1977		
California	47	16	1,100	$ 37	$ 62
Colorado	8	4	400	10	17
Connecticut	24	10	1,800	50	72
Illinois	52	25	6,400	177	276
Indiana	11	7	600	18	31
Kansas	5	3	300	7	12
Michigan	58	22	2,000	68	110
Missouri	12	6	300	5	8
New York	29	11	2,200	65	96
Ohio	34	19	4,600	167	255
Pennsylvania	19	7	900	37	59
Texas	10	4	200	4	6
STATE			1982(d)		
California	42	13	1,000	$ 36	$ 79
Colorado	6	3	(a)	D	D
Connecticut	24	9	800	28	48
Illinois	56	25	4,400	232	397
Indiana	10	7	(b)	D	D
Kansas	5	3	300	10	19
Massachusetts	13	2	(a)	D	D
Michigan	55	22	1,600	67	117
Minnesota	5	2	(b)	D	D
Missouri	11	4	300	9	15
New Jersey	20	4	(b)	D	D
New York	31	9	1,700	49	91
North Carolina	4	3	(a)	D	D
Ohio	47	18	4,400	173	329
Pennsylvania	24	10	(c)	D	D
Virginia	4	2	(a)	D	D
Washington	6	2	200	8	12

D – Withheld to avoid disclosure.

(a) 150 – 249 Employees.
(b) 250 – 499 Employees.
(c) 1,000 – 2,499 Employees.
(d) Machine tool employees or more.

Source: U.S. Bureau of the Census, "Census of Manufactures 1977, 1982 Industry Series: Metalworking Machinery and Equipment, MC82 – 1 – 35C" and earlier issues. See chapter introduction.

THE MACHINE TOOL INDUSTRY
By Employment Size of Establishment
For Selected Years, 1963 to 1982

	1963	1967	1972	1977	1982
Number of Companies	1,146	1,209	1,232	1,285	1,290
Number of Establishments	1,167	1,253	1,277	1,345	1,392
Number of Employees	83,136	116,400	76,600	83,100	77,600(e)
1 to 4 Employees					
Establishments	375	336	380	434	433
Employees	714	500	800	800	900
5 to 9 Employees					
Establishments	191	189	212	262	279
Employees	1,295	1,300	1,500	1,700	1,900
10 to 19 Employees					
Establishments	186	222	248	178	225
Employees	2,612	3,100	3,400	2,400	3,000
20 to 49 Employees					
Establishments	182	218	194	219	202
Employees	5,643	6,500	6,000	6,700	6,200
50 to 99 Employees					
Establishments	96	111	89	98	110
Employees	6,455	7,700	6,200	6,700	7,600
100 to 249 Employees					
Establishments	67	79	83	75	75
Employees	10,620	12,700	12,500	11,500	11,900
250 to 499 Employees					
Establishments	31	43	37	41	29
Employees	11,249	15,100	12,600	14,800	9,700
500 to 999 Employees					
Establishments	22	30	24	27	31
Employees	15,583	21,400	17,600	21,700(a)	22,100(a)
1000 to 2499 Employees					
Establishments	22	8	8	7	14
Employees	19,236	35,500	16,200(b)	16,600(b,d)	14,200(b,d)
2500 Employees or More					
Establishments	3	3	2	1	1
Employees	9,729	12,400	(c)	(c)	(c)
Covered by Administrative Records (f)					
Establishments	NA	330	355	673	740
Employees	NA	700	900	3,200	3,800

NA – Not Available.

(a) Also includes data for the "1000 to 2499 Employees" (metal forming only) category.
(b) Includes only metal cutting to avoid disclosure.
(c) The number of employees is included in the "1000 – 2499 Employees" category.
(d) Also includes data for the "2500 Employees or More" (metal cutting only) category.
(e) Due to estimating procedures by the Census department, individual items may not add to total.
(f) See chapter 3 introduction for an explanation.

Source: U.S. Bureau of the Census, "Census of Manufactures, 1982 Industry Series: Metalworking Machinery and Equipment, MC82 – 1 – 35C," and earlier issues. See chapter introduction.

THE METAL CUTTING MACHINE TOOL INDUSTRY
By Employment Size of Establishment
For Selected Years, 1963 to 1982

	1963	1967	1972	1977	1982
Number of Companies	794	865	857	874	860
Number of Establishments	801	903	894	919	940
Number of Employees	61,058	87,200	52,500	59,400	58,100
1 to 4 Employees					
Establishments	276	256	281	315	295
Employees	529	400	600	600	600
5 to 9 Employees					
Establishments	127	142	158	184	202
Employees	840	1,000	1,100	1,200	1,400
10 to 19 Employees					
Establishments	129	167	180	112	150
Employees	1,803	2,300	2,500	1,500	2,000
20 to 49 Employees					
Establishments	118	145	126	144	122
Employees	3,607	4,300	3,900	4,400	3,600
50 to 99 Employees					
Establishments	56	74	55	67	73
Employees	3,727	5,200	3,600	4,600	4,900
100 to 249 Employees					
Establishments	44	49	47	40	45
Employees	6,912	8,100	7,000	6,300	7,000
250 to 499 Employees					
Establishments	22	30	24	28	22
Employees	7,713	10,600	8,400	10,300	7,500
500 to 999 Employees					
Establishments	15	20	14	19	24
Employees	10,664	13,900	9,200	13,800	16,700
1000 to 2499 Employees					
Establishments	11	17	7	7	6
Employees	15,534	28,900	16,200(a)	16,600(a)	14,200(a)
2500 Employees or More					
Establishments	3	3	2	1	1
Employees	9,729	12,400	(b)	(b)	(b)
Covered by Administrative Records (c)					
Establishments	NA	245	265	465	545
Employees	NA	500	700	1,800	2,900

NA - Not Available.

(a) Also includes data for the "2500 Employees or More" category.
(b) The number of employees is included in the "1000-2499 Employees" category.
(c) See chapter 3 introduction for an explanation.

Source: U.S. Bureau of the Census, "Census of Manufactures, 1982 Industry Series: Metalworking Machinery and Equipment, MC82-1-35C," and earlier issues. See chapter introduction.

THE METAL FORMING MACHINE TOOL INDUSTRY
By Employment Size of Establishment
For Selected Years, 1963 to 1982

	1963	1967	1972	1977	1982
Number of Companies	362	344	376	411	430
Number of Establishments	366	350	383	426	452
Number of Employees	22,078	29,200	24,100	23,700	19,500
1 to 4 Employees					
Establishments	99	80	99	119	138
Employees	165	100	200	200	300
5 to 9 Employees					
Establishments	64	47	54	78	77
Employees	455	300	400	500	500
10 to 19 Employees					
Establishments	57	55	68	66	75
Employees	809	800	900	900	1,000
20 to 49 Employees					
Establishments	64	73	68	75	80
Employees	2,036	2,200	2,100	2,300	2,400
50 to 99 Employees					
Establishments	40	37	34	31	37
Employees	2,726	2,500	2,400	2,100	2,700
100 to 249 Employees					
Establishments	23	30	36	35	30
Employees	3,708	4,600	5,500	5,200	4,900
250 to 499 Employees					
Establishments	9	13	13	13	7
Employees	3,536	4,500	4,200	4,500	2,200
500 to 999 Employees					
Establishments	7	10	10	8	7
Employees	4,919	7,500	8,400(a)	7,900(a)	5,400(a)
1000 to 2499 Employees					
Establishments	3	5	1	1	1
Employees	3,702	6,600	(c)	(c)	(c)
2500 Employees or More					
Establishments	—	—	—	—	—
Employees	—	—	—	—	—
Covered by Administrative Records (d)					
Establishments	NA	85	90	218	195
Employees	NA	200	200	1,400	900

NA - Not Available.

(a) Also includes data for the "1000 to 2499 Employees" category.
(b) Due to estimating procedures by the Census department, individual items may not add to total.
(c) The number of employees is included in the "500-999 Employees" category.
(d) See chapter 3 introduction for an explanation.

Source: U.S. Bureau of the Census, "Census of Manufactures, 1982 Industry Series: Metalworking Machinery and Equipment, MC82-1-35C," and earlier issues. See chapter introduction.

INVENTORIES OF THE MACHINE TOOL INDUSTRY
End of Year, Selected Years, 1973 to 1984
(Millions of Dollars)

	Total Machine Tool Industry	Metal Cutting SIC 3541	Metal Forming SIC 3542
TOTAL INVENTORIES			
1973	$ 885.7	$ 591.9	$293.8
1974	1,150.0	786.2	363.8
1975	1,100.4	737.9	362.5
1976	1,048.3	735.4	312.9
1977	1,238.0	878.4	359.6
1978	1,434.0	1,012.3	421.7
1979	1,689.2	1,242.2	447.0
1980	1,874.6	1,419.4	455.2
1981	2,359.1	1,764.9	594.2
1982	1,943.1	1,431.6	511.5
1983	1,642.9	1,219.4	423.5
1984	1,690.6	1,237.4	453.2
Finished Products			
1973	174.7	111.0	63.7
1974	223.8	148.3	75.5
1975	244.6	166.0	78.6
1976	233.5	168.9	64.6
1977	264.7	184.2	80.5
1978	282.4	199.7	82.7
1979	312.1	222.3	89.8
1980	354.1	253.5	100.6
1981	507.1	343.6	163.5
1982	501.0	355.6	145.4
1983	441.5	310.2	131.3
1984	404.0	282.2	121.8
Work in Process			
1973	521.2	371.4	149.8
1974	678.2	492.6	185.6
1975	618.1	447.7	170.4
1976	596.3	443.8	152.5
1977	717.6	537.5	180.1
1978	868.5	642.3	226.2
1979	1,042.8	812.5	230.3
1980	1,220.3	989.4	230.9
1981	1,413.2	1,117.4	295.8
1982	1,047.1	809.5	237.6
1983	863.8	669.7	194.1
1984	928.1	705.5	222.6
Materials, Supplies, Fuel, Etc.			
1973	189.8	109.5	80.3
1974	248.0	145.3	102.7
1975	237.7	124.2	113.5
1976	218.4	122.7	95.7
1977	255.7	156.7	99.1
1978	283.1	170.3	112.8
1979	334.3	207.4	126.9
1980	300.0	176.4	123.6
1981	438.7	303.8	134.9
1982	395.0	266.5	128.5
1983	337.3	239.5	97.8
1984	358.5	249.7	108.8

* Beginning in 1983, a uniform reporting method was introduced based on cost or market valuations of inventories. This change replaces the numerous accounting methodologies accepted in the past.

Sources: U.S. Bureau of the Census, "Census of Manufactures, 1982 Industry Series: Metalworking Machinery and Equipment, MC82(1)-35C" and earlier issues; U.S. Bureau of the Census, "Annual Survey of Manufactures." See chapter introduction.

PRODUCTS OF THE METAL CUTTING AND FORMING INDUSTRIES

Selected Years, 1967 to 1982

(Values in Millions of Dollars)

Metal Cutting Industry (3541)	TOTAL SHIPMENTS	Metal Cutting Machine Tools	Secondary Products	Miscellaneous Receipts	% Primary Product Specialization
1967	$2,127.2	$1,715.7	$269.7	$141.8	86%
1972	1,418.1	1,135.5	188.9	93.7	86
1977	2,812.7	2,353.9	337.0	121.8	87
1982	4,440.2	3,877.2	369.5	193.6	91

Metal Forming Industry (3542)	TOTAL SHIPMENTS	Metal Forming Machine Tools	Secondary Products	Miscellaneous Receipts	% Primary Product Specialization
1967	$ 714.0	$ 568.4	$ 99.5	$ 46.1	85%
1972	696.3	583.6	73.1	39.6	89
1977	1,130.6	967.1	111.6	51.9	90
1982	1,428.7	1,210.5	143.6	74.6	89

Note: "Primary Product Specialization" is arrived at by dividing "Primary Products" by "Primary Products plus Secondary Products."

Source: U.S. Bureau of the Census, "Census of Manufactures, 1982; Industry Series: Metalworking Machinery and Equipment MC82-1-35C" and earlier issues. See chapter introduction.

SELECTED MATERIALS CONSUMED

By the Machine Tool Industry, Selected Years

Quantity Used

Material	Unit of Measure	Metal Cutting Industry			Metal Forming Industry		
		1972	1977	1982	1972	1977	1982
MILL SHAPES							
Carbon Steel	Short Ton	85,900(i)	NA	NA	139,100(j)	113,400(a)	52,500(q)
Stainless Steel	Short Ton	900	NA	NA	500	100(m)	NA
Other Alloy Steel	Short Ton	24,500	20,000(o)	NA	9,600	12,000(n)	NA
Copper and Alloy	000 Lbs.	600(h,k)	3,800(d,h)	NA	300(k)	800(k)	NA
Aluminum and Alloy	000 Lbs.	1,400(b)	NA	NA	NA	1,100	NA
Iron and Steel Scrap	Short Ton	20,100	6,500	NA	D	NA	D
CASTINGS (Rough and Semifinished)							
Iron (Gray & Malleable)	Short Ton	69,900	77,900(p)	7,300(r)	36,500	NA	D
Steel	Short Ton	NA	NA	D	11,100	12,400(p)	D
Aluminum and Alloy	000 Lbs.	NA	NA	D	700	2,600(p)	0
Copper and Alloy	000 Lbs.	1,100	1,700(p)	0	2,600	NA	0
IRON AND STEEL FORGINGS							
Iron & Steel Forgings	Short Ton	4,700	5,900(p)	NA	7,500	8,200(p)	NA
ELECTRIC MOTORS AND GENERATORS							
Fractional	Number	96,300(c)	1,900(l,p)	D	900(1)	1,900(1,p)	0
Integral	Number	NA	NA	900(r)	NA	NA	D

NA - Not Available. D - Withheld to avoid disclosure.

(a) Excludes structural shapes and all other carbon steel.
(b) Sheet and extrusion only.
(c) Excludes timing motors.
(d) Insulated wire and cable only.
(e) Excludes wire and wire products and sheet and strip.
(f) Excludes plate, sheet and strip and pipe and tube.
(g) Sheet and plate only.
(h) Bare wire only.
(i) Bars and bar shapes, sheet and strip, and plates only.
(j) Bars and bar shapes, sheet and strip, plates, and structural shapes only.
(k) Rod, bar, and mechanical wire and plate, sheet, and strip only.
(l) Timing motors only.
(m) Sheet and strip only.
(n) Excludes bars and bar shapes.
(o) Bars and bar shapes only.
(p) Purchased only.
(q) Plates only.
(r) Produced & Consumed only, no Purchases.

Source: U.S. Bureau of the Census, "Census of Manufactures, 1982, 1977, 1972: Industry Series: Metalworking Machinery and Equipment." See chapter introduction.

SELECTED MATERIALS CONSUMED
By the Machine Tool Industry, Selected Years
(Millions of Dollars)

Material	Metal Cutting Industry			Metal Forming Industry		
	1972	1977	1982	1972	1977	1982
GRAND TOTAL	$ 454.3	$ 904.4	$1,380.0	$ 253.4	$ 395.7	$512.8
MILL SHAPES–						
Carbon Steel	34.4	63.1	69.6	36.7	58.3	58.0
Stainless Steel	3.2	3.0	1.6	.6	.7	.8
Other Alloy Steel	15.5	23.2	18.8	7.0	12.1	7.5
Copper and Alloy	3.5	5.5	8.2	1.1(a)	2.4(c)	19.0
Aluminum and Alloy	1.4	1.7	3.4	0.8	2.7	.5(b)
Iron and Steel Scrap	.9	1.1	2.3	D	.7	.3
CASTINGS (Rough and Semifinished)						
Iron (Gray and Malleable)	43.6	84.5	88.0	18.1	29.4	27.0
Steel	4.4	8.7	54.6	8.9	18.8	16.6
Aluminum and Alloy	4.1	6.0	3.0	.8	2.9	2.4
Copper and Alloy	1.2	2.5	1.2	2.9	1.5	2.9
IRON AND STEEL FORGINGS						
Iron and Steel Forgings	4.3	8.7	15.4	6.1	11.3	13.8
ELECTRICAL MOTORS AND GENERATORS						
Fractional	4.3	7.0	26.8	.6	2.7	5.1
Integral	16.3	26.3	35.1	6.6	12.6	6.7
BEARINGS						
Ball and Roller	13.2	18.6	25.9	3.7	7.6	9.5
ALL OTHER MATERIALS						
Components, Parts, Etc.	227.0	478.6	753.6	114.7	151.7	174.3
NO BREAKDOWN FURNISHED						
Materials, Parts, Containers and Supplies	77.0	165.9	272.5	44.8	80.3	166.9

D - Withheld to avoid disclosure.

(a) Excludes bare wire, pipe and tube.
(b) Sheet, plate and foil only.
(c) Excludes plate, sheet and strip.

Source: U.S. Bureau of the Census "Census of Manufactures, 1982, 1977, 1972: Industry Series: Metalworking Machinery and Equipment," and earlier issues. See chapter introduction.

4

U. S. MACHINE TOOL SHIPMENTS AND ORDERS

This chapter deals with machine tool products shipped by the machine tool industry and other industries.

Up and Down Performance

The machine tool business is highly cyclical, a fact evidenced by historical patterns of new orders, shipments and order backlogs. The dramatic ups and downs in the value of shipments and orders tend to obscure significant changes in the "product mix;" the share of the total comprised by the different major machine tool product categories.

One of the more notable of these changes is the increased share of "other machines" in metal cutting machine tool shipments. This category's share of output has risen from 15-20% in the late 1950s and early 1960s to more than twice that level in recent years. The reason for this dramatic rise is that this group includes station type machines and multi-function NC machines (machining centers). As such, its increased market share demonstrates parallel yet divergent trends ongoing in American metalworking.

Station type machines are highly specialized, dedicated machines, designed to produce one part in volumes of up to hundreds of thousands per year. They are the model of efficiency through the use of dedicated mass production. Machining centers, on the other hand, represent efficiency through flexibility. By virtue of their tool changing capability and their numerical control - in which a part-making program maintains the production process rather than manual control - these machines can be easily reprogrammed to produce a variety of parts.

These are only two examples of how machine tool technology and America's machine tool builders have responded to the changing metalworking needs of America's manufacturers.

Data Sources

Census and Annual Survey of Manufactures

The broadest coverage of machine tool shipment data is provided by the Census of Manufacturers and the Annual Surveys of Manufacturers. Included in these reports are statistics for: most of the major categories of metal cutting machine tools (boring, drilling, gear cutting, presses, etc.), machine tools primarily designed for home workshops and laboratories, parts sold separately, and machine tools originating primarily from small-sized plants-not specified by kind. Broad coverage is given to both metal cutting and metal forming machine tools in these reports.

The comprehensive Census of Manufacturers is taken every five years (those ending in 2 and 7) and the Annual Survey of Manufacturers is published in non-Census years. The charts and tables in this chapter were updated with published revised reports from the 1982 Census of Manufacturers.

There are two other sources of machine tool shipment data widely used by students of the industry. One is the monthly order and shipment series published by NMTBA. The other is the quarterly "Current Industrial Report, Metalworking Machinery" (MQ-35W), published by the U.S. Department of Commerce. The MQ-35W provides more detailed coverage of shipments by product types than either the Census or Survey of Manufacturers. Both the MQ-35W and the NMTBA estimates are more timely and are published more frequently than the Census or Annual Survey.

NMTBA Estimate of Orders and Shipments

The NMTBA "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments, and Backlog" is published monthly, normally three or four weeks after the end of the month reported. This report differs from the broader Census report in that it is limited to complete machine tools and excludes the value of: (a) machine tools costing under $2,500, (b) machine tools designed for home workshops, etc., (c) rebuilt machines and (d) parts sold separately.

Machine tool manufacturers representing more than two-thirds of total U.S. machine tool shipments participate in the NMTBA survey. The figures received each month from respondents are expanded, based on "benchmark" totals derived from the MQ-35W reports, to an estimate of the industry total by NMTBA's Statistical Department.

The MQ-35W Report

The "Current Industrial Report, Metalworking Machinery" (MQ-35W) is published quarterly, usually about three months after the end of the quarter reported, by the Bureau of the Census.

The report covers the number and value of total machine tools shipped, by 5- and 7-digit SIC categories, for more than 120 different machine tool products. It does not report new orders but does report unfilled orders.

The report is limited to information on complete new machine tools, excluding data for small machine tools designed for home use, etc., and data for rebuilt machines. It lists separately machines with a value of $2,500 and over, and those with a value under $2,500. The MQ-35W figures, excluding machine tools with an average value under $2,500, form the benchmark used for the NMTBA "Industry Estimate."

The MQ-35W report also provides data on numerically controlled machine tools and on manufacturers' exports. It is intended to cover all manufacturers of machine tool products, including those who produce machine tools for their own use but not for sale in the marketplace, and thus to cover all shipments.

SHIPMENTS

Metal Cutting and Metal Forming Machine Tools, 1959 to Date

(Millions of Dollars)

Year	TOTAL			Metal Cutting			Metal Forming		
	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1959	$ 616	$ 538	$ 78	$ 441	$ 390	$ 51	$ 175	$148	$ 27
1960	744	580	164	541	420	121	203	160	43
1961	751	522	229	541	366	175	210	156	54
1962	821	606	215	613	450	163	208	156	52
1963	896	741	155	639	526	113	257	215	42
1964	1,164	959	205	845	679	166	319	280	39
1965	1,426	1,249	177	1,023	886	137	403	363	40
1966	1,685	1,535	150	1,222	1,098	124	463	437	26
1967	1,806	1,618	188	1,353	1,211	142	453	407	46
1968	1,727	1,563	164	1,358	1,238	120	369	325	44
1969	1,597	1,446	151	1,192	1,077	115	405	369	36
1970	1,443	1,239	204	993	827	166	450	412	38
1971	998	840	158	672	554	118	326	286	40
1972	1,019	894	124	714	627	87	304	267	37
1973	1,501	1,323	178	1,074	935	139	427	388	39
1974	2,031	1,763	267	1,445	1,241	205	585	522	63
1975	2,452	2,033	419	1,879	1,548	331	573	484	89
1976	2,060	1,744	316	1,482	1,270	212	578	474	104
1977	2,281	2,030	251	1,651	1,470	181	630	560	70
1978	3,013	2,689	325	2,189	1,960	228	825	729	96
1979	3,877	3,465	411	2,930	2,605	325	947	860	87
1980	4,692	4,084	608	3,681	3,206	475	1,011	878	133
1981	5,096	4,377	719	4,105	3,553	552	991	824	167
1982	3,604	3,198	406	2,895	2,599	296	710	600	110
1983	1,845	1,630	215	1,372	1,200	172	474	430	43
1984	2,286	2,093	193	1,607	1,484	123	679	609	71
1985	2,545	2,291	254	1,742	1,549	194	803	743	60
1986	2,579	2,306	272	1,890	1,685	206	688	621	67
1987	2,324	2,037	287	1,677	1,499	178	647	538	109
1988	2,399	2,102	297	1,574	1,400	174	825	702	122

Individual items may not add to totals due to rounding.

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

NET NEW ORDERS

Metal Cutting and Metal Forming Machine Tools, 1959 to Date

(Millions of Dollars)

	TOTAL			Metal Cutting			Metal Forming		
Year	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1959	$ 748	$ 644	$104	$ 541	$ 471	$ 70	$ 207	$173	$ 34
1960	744	527	217	535	375	160	209	152	57
1961	772	536	236	591	401	190	181	135	46
1962	815	661	154	571	468	103	244	193	51
1963	1,061	869	192	760	607	153	301	262	39
1964	1,577	1,348	229	1,038	861	177	539	487	52
1965	1,692	1,532	160	1,251	1,122	129	441	410	31
1966	2,074	1,884	190	1,629	1,483	146	445	401	44
1967	1,420	1,272	148	1,134	1,024	110	286	248	38
1968	1,474	1,320	154	1,080	960	120	394	360	34
1969	1,728	1,517	211	1,195	1,033	162	533	484	49
1970	912	733	179	651	507	144	261	226	35
1971	861	747	114	609	524	85	252	223	29
1972	1,412	1,245	167	1,009	877	132	403	368	35
1973	2,613	2,268	345	1,825	1,550	275	787	717	70
1974	2,583	2,185	398	2,017	1,716	301	566	470	96
1975	1,277	1,064	213	916	781	135	361	284	77
1976	2,203	1,961	242	1,662	1,477	185	541	485	56
1977	2,995	2,709	286	2,202	1,981	221	793	729	64
1978	4,349	3,944	405	3,375	3,043	332	973	901	72
1979	5,621	4,856	765	4,495	3,866	629	1,126	991	135
1980	4,754	4,239	515	3,885	3,496	389	870	744	126
1981	2,945	2,563	382	2,228	1,946	282	717	617	100
1982	1,498	1,261	236	1,064	890	175	433	372	62
1983	1,696	1,558	138	1,152	1,069	82	545	489	56
1984	2,916	2,631	285	1,916	1,700	216	1,000	932	69
1985	2,528	2,262	266	1,853	1,652	201	675	610	65
1986	2,125	1,883	242	1,544	1,377	168	581	507	74
1987	2,119	1,831	288	1,451	1,294	157	667	536	131
1988	3,591	3,065	526	2,708	2,316	392	883	749	134

Individual items may not add to totals due to rounding.

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

GROSS NEW ORDERS, CANCELLATIONS, AND NET NEW ORDERS

Metal Cutting and Metal Forming Machine Tools, 1964 to Date

(Millions of Dollars)

	TOTAL			Metal Cutting			Metal Forming		
Year	Gross New Orders	Cancellations	Net New Orders	Gross New Orders	Cancellations	Net New Orders	Gross New Orders	Cancellations	Net New Orders
1964	$1,652	$ 75	$1,577	$1,084	$ 46	$1,038	$ 568	$ 29	$ 539
1965	1,771	79	1,692	1,312	61	1,251	459	18	441
1966	2,217	143	2,074	1,737	108	1,629	480	35	445
1967	1,614	194	1,420	1,292	158	1,134	322	36	286
1968	1,631	157	1,474	1,216	136	1,080	415	21	394
1969	1,910	182	1,728	1,332	137	1,195	578	45	533
1970	1,060	148	912	757	106	651	303	42	261
1971	933	72	861	655	46	609	278	25	252
1972	1,465	53	1,412	1,051	42	1,009	414	11	403
1973	2,773	160	2,613	1,958	132	1,825	815	28	787
1974	2,970	387	2,583	2,283	266	2,017	687	121	566
1975	1,651	374	1,277	1,198	282	916	453	92	361
1976	2,370	167	2,203	1,793	131	1,662	578	37	541
1977	3,153	158	2,995	2,329	127	2,202	824	31	793
1978	4,573	224	4,349	3,559	184	3,375	1,013	40	973
1979	6,063	442	5,621	4,873	378	4,495	1,190	64	1,126
1980	5,381	627	4,754	4,436	551	3,885	946	76	870
1981	3,585	640	2,945	2,799	571	2,228	786	69	717
1982	1,934	437	1,498	1,467	402	1,064	468	34	433
1983	1,890	194	1,696	1,328	177	1,152	561	17	545
1984	3,044	128	2,916	2,005	90	1,916	1,038	38	1,000
1985	2,716	188	2,528	1,983	130	1,853	733	58	675
1986	2,322	197	2,125	1,675	131	1,544	647	66	581
1987	2,253	134	2,119	1,533	82	1,451	719	52	667
1988	3,722	131	3,591	2,795	87	2,708	927	44	883

Individual items may not add to totals due to rounding.

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

UNFILLED ORDERS

Metal Cutting and Metal Forming Machine Tools, 1964 to Date

(Millions of Dollars)

As of December 31	Total	Metal Cutting	Metal Forming	As of December 31	Total	Metal Cutting	Metal Forming
1964	$1,043	$ 669	$374	1977	$2,308	$1,794	$515
1965	1,311	899	412	1978	3,643	2,981	663
1966	1,701	1,307	394	1979	5,388	4,546	843
1967	1,317	1,089	228	1980	5,451	4,750	701
1968	1,064	810	412	1981	3,300	2,873	427
1969	1,195	812	394	1982	1,194	1,043	151
1970	706	471	228	1983	1,045	823	222
1971	569	408	162	1984	1,675	1,132	542
1972	963	702	621	1985	1,658	1,243	414
1973	2,074	1,454	621	1986	1,204	897	307
1974	2,625	2,025	600	1987	1,000	672	327
1975	1,450	1,062	388	1988	2,191	1,806	386
1976	1,594	1,243	351				

Individual items may not add to totals due to rounding.

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

METAL CUTTING GROSS NEW ORDERS, CANCELLATIONS, AND NET NEW ORDERS

Domestic & Foreign, 1959 to Date

(Millions of Dollars)

	TOTAL			Domestic			Foreign		
Year	Gross New Orders	Cancel-lations	Net New Orders	Gross New Orders	Cancel-lations	Net New Orders	Gross New Orders	Cancel-lations	Net New Orders
1959	$ 559	$ 18	$ 541	$ 486	$ 15	$ 471	$ 73	$ 3	$ 70
1960	571	36	535	408	33	375	163	3	160
1961	621	30	591	425	24	401	196	6	190
1962	603	32	571	494	26	468	109	6	103
1963	790	30	760	632	25	607	158	5	153
1964	1,084	46	1,038	896	35	861	188	11	177
1965	1,312	61	1,251	1,175	53	1,122	137	8	129
1966	1,737	108	1,629	1,580	97	1,483	157	11	146
1967	1,292	158	1,134	1,173	149	1,024	119	9	110
1968	1,216	136	1,080	1,091	131	960	125	5	120
1969	1,332	137	1,195	1,160	127	1,033	172	10	162
1970	757	106	651	605	99	506	152	7	145
1971	655	46	609	565	41	524	90	5	85
1972	1,051	42	1,009	916	39	877	135	3	132
1973	1,953	132	1,825	1,675	124	1,550	283	8	275
1974	2,283	266	2,017	1,959	243	1,716	324	23	301
1975	1,198	282	916	1,027	247	780	171	35	136
1976	1,793	131	1,662	1,594	117	1,477	199	14	185
1977	2,329	127	2,202	2,095	114	1,981	234	13	221
1978	3,559	184	3,375	3,203	160	3,043	356	24	332
1979	4,873	378	4,495	4,202	337	3,866	671	42	629
1980	4,436	551	3,885	3,986	490	3,496	450	61	389
1981	2,799	571	2,228	2,476	530	1,946	323	41	282
1982	1,467	402	1,064	1,262	373	890	204	30	175
1983	1,328	177	1,152	1,236	167	1,069	92	10	82
1984	2,005	90	1,916	1,780	80	1,700	226	9	216
1985	1,983	130	1,853	1,769	117	1,652	213	13	201
1986	1,675	131	1,544	1,499	122	1,377	176	9	168
1987	1,533	82	1,451	1,366	71	1,294	167	10	157
1988	2,795	87	2,708	2,392	76	2,316	403	11	392

Individual items may not add to totals due to rounding.

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

METAL FORMING GROSS NEW ORDERS, CANCELLATIONS, AND NET NEW ORDERS

Domestic & Foreign, 1959 to Date

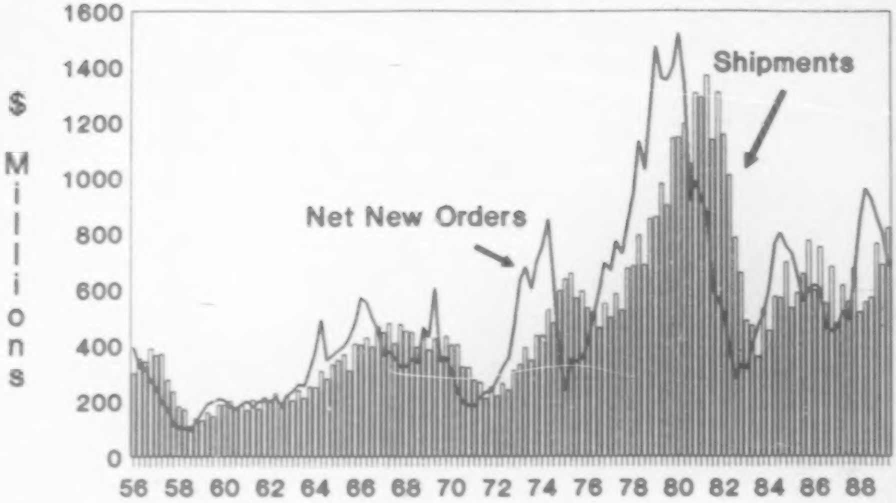
(Millions of Dollars)

	TOTAL			Domestic			Foreign		
Year	Gross New Orders	Cancel-lations	Net New Orders	Gross New Orders	Cancel-lations	Net New Orders	Gross New Orders	Cancel-lations	Net New Orders
1959	$ 210	$ 3	$ 207	$ 175	$ 2	$173	$ 35	$ 1	$ 34
1960	219	10	209	161	9	152	58	1	57
1961	187	6	181	139	4	135	48	2	46
1962	249	5	244	197	4	193	52	1	51
1963	309	8	301	269	7	262	40	1	39
1964	568	29	539	511	24	487	57	5	52
1965	459	18	441	427	17	410	32	1	31
1966	480	35	445	434	33	401	46	2	44
1967	322	36	286	281	33	248	41	3	38
1968	415	21	394	380	20	360	35	1	34
1969	578	45	533	527	43	484	51	2	49
1970	303	42	261	265	38	227	38	4	34
1971	278	25	252	244	21	223	34	4	29
1972	414	11	403	378	10	368	36	1	35
1973	815	28	787	742	25	717	73	3	70
1974	687	121	566	583	113	470	105	8	96
1975	453	92	361	364	81	284	89	12	77
1976	578	37	541	513	28	485	64	8	56
1977	824	31	793	757	29	729	67	2	64
1978	1,013	40	973	938	37	901	75	3	72
1979	1,190	64	1,126	1,048	57	991	142	7	136
1980	946	76	870	814	70	744	132	6	126
1981	786	69	717	680	63	617	106	6	100
1982	468	34	433	399	28	372	68	7	62
1983	561	17	545	503	14	489	58	2	56
1984	1,038	38	1,000	967	36	932	71	3	69
1985	733	58	675	664	54	610	69	4	65
1986	647	66	581	567	60	507	81	7	74
1987	719	52	667	583	47	536	136	5	131
1988	927	44	883	788	39	749	138	5	134

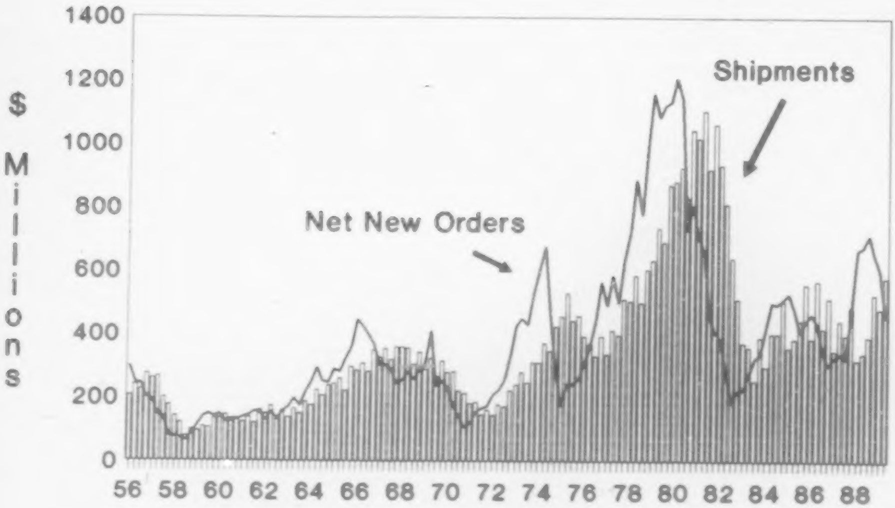
Individual items may not add to totals due to rounding.

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

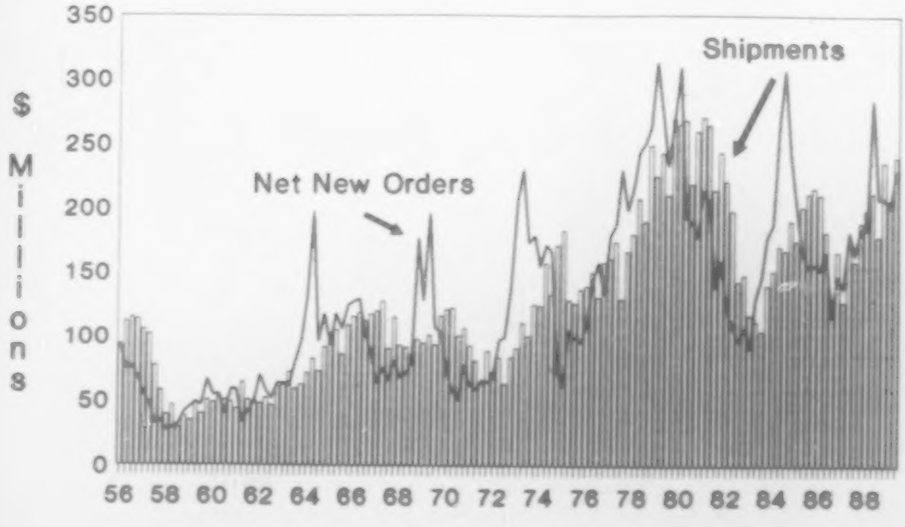
Total Machine Tools
Shipments and Net New Orders
Quarterly, 1956:1 to 1989:2



Metal Cutting Machine Tools
Shipments and Net New Orders
Quarterly, 1956:1 to 1989:2



Metal Forming Machine Tools
Shipments and Net New Orders
Quarterly, 1956:1 to 1989:2



SHIPMENTS OF MACHINE TOOLS
Quarterly and Yearly, 1956-1963
(Thousands of Dollars)

	TOTAL		Metal Cutting		Metal Forming	
Period	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
1956-1 qtr.	$ 274,100	$ 23,750	$187,700	$ 18,550	$ 86,400	$ 5,200
2	326,100	25,600	218,700	21,150	107,400	4,450
3	319,200	21,100	208,100	17,350	111,100	3,750
4	350,900	36,550	243,700	29,950	107,200	6,600
Total	$1,270,300	$107,000	$858,200	$ 87,000	$412,100	$20,000
1957-1 qtr.	$ 331,900	$ 33,350	$232,950	$ 26,650	$ 98,950	$ 6,700
2	325,700	41,900	236,150	29,650	89,550	12,250
3	248,050	28,350	179,300	19,800	68,750	8,550
4	204,700	28,750	155,150	20,500	49,550	8,250
Total	$1,110,350	$132,350	$803,550	$ 96,600	$306,800	$35,750
1958-1 qtr.	$ 160,050	$ 19,900	$125,500	$ 15,400	$ 34,550	$ 4,500
2	141,800	25,700	105,050	15,750	36,750	9,950
3	90,300	17,450	65,400	13,050	24,900	4,400
4	115,000	21,000	85,150	13,100	29,850	7,900
Total	$ 507,150	$ 84,050	$381,100	$ 57,300	$126,050	$26,750
1959-1 qtr.	$ 108,200	$ 20,750	$ 79,300	$ 14,900	$ 28,900	$ 5,850
2	137,450	19,550	95,450	12,050	42,000	7,500
3	130,650	14,400	95,050	10,000	35,600	4,400
4	162,000	23,000	120,050	13,800	41,950	9,200
Total	$ 538,300	$ 77,700	$389,850	$ 50,750	$148,450	$26,950
1960-1 qtr.	$ 159,550	$ 25,950	$117,700	$ 18,700	$ 41,850	$ 7,250
2	160,400	38,500	116,950	28,750	43,450	9,750
3	136,950	38,650	96,350	28,450	40,600	10,200
4	123,950	60,050	89,750	44,850	34,200	15,200
Total	$ 580,850	$163,150	$420,750	$120,750	$160,100	$42,400
1961-1 qtr.	$ 116,150	$ 50,100	$ 83,650	$ 38,550	$ 32,500	$11,550
2	146,450	56,650	95,900	42,550	50,550	14,100
3	117,200	53,750	80,250	39,800	36,950	13,950
4	142,850	67,750	106,750	53,800	36,100	13,950
Total	$ 522,650	$228,250	$366,550	$174,700	$156,100	$53,550
1962-1 qtr.	$ 140,250	$ 57,700	$106,100	$ 43,900	$ 34,150	$13,800
2	159,750	66,950	121,150	53,050	38,600	13,900
3	136,200	41,250	98,400	32,400	37,800	8,850
4	169,850	49,300	124,400	33,450	45,450	15,850
Total	$ 606,050	$215,200	$450,050	$162,800	$156,000	$52,400
1963-1 qtr.	$ 163,100	$ 36,850	$112,600	$ 24,650	$ 50,500	$12,200
2	203,300	33,500	140,550	23,600	62,750	9,900
3	173,000	36,150	122,450	27,450	50,550	8,700
4	201,850	48,000	150,450	36,700	51,400	11,300
Total	$ 741,250	$154,500	$526,050	$112,400	$215,200	$42,100

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

SHIPMENTS OF MACHINE TOOLS
Quarterly and Yearly, 1964-1971
(Thousands of Dollars)

Period	TOTAL		Metal Cutting		Metal Forming	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
1964-1 qtr.	$–197,250	$ 50,700	$ 135,900	$ 40,550	$ 61,350	$10,150
2	259,800	46,700	183,550	39,850	76,250	6,850
3	231,200	47,950	170,400	35,700	60,800	12,250
4	271,500	59,250	189,300	49,400	82,200	9,850
Total	$ 959,750	$204,600	$ 679,150	$165,500	$280,600	$39,100
1965-1 qtr.	$ 304,100	$ 42,600	$ 209,850	$ 34,150	$ 94,250	$ 8,450
2	319,850	45,700	225,200	35,100	94,650	10,600
3	271,300	36,700	193,700	27,850	77,600	8,850
4	353,550	51,800	257,100	39,600	96,450	12,200
Total	$1,248,800	$176,800	$ 885,850	$136,700	$362,950	$40,100
1966-1 qtr.	$ 361,650	$ 39,000	$ 253,900	$ 31,350	$107,750	$ 7,650
2	389,700	36,150	277,200	30,150	112,500	6,000
3	361,950	32,300	256,800	25,150	105,150	7,150
4	421,050	43,400	309,600	37,600	111,450	5,800
Total	$1,534,350	$150,850	$1,097,500	$124,250	$436,850	$26,600
1967-1 qtr.	$ 399,500	$ 41,050	$ 289,750	$ 35,900	$109,750	$10,000
2	428,850	50,750	315,450	36,250	113,400	14,050
3	367,350	45,900	287,200	30,800	80,150	10,250
4	422,250	50,300	318,650	39,200	103,600	11,550
Total	$1,617,950	$188,000	$1,211,050	$142,150	$406,900	$45,850
1968-1 qtr.	$ 402,200	$ 48,250	$ 321,500	$ 36,000	$ 80,700	$12,250
2	392,800	53,550	313,850	40,950	78,950	12,600
3	361,750	29,550	282,900	21,650	78,850	7,900
4	406,000	32,800	320,050	21,400	85,950	11,400
Total	$1,562,750	$164,150	$1,238,300	$120,000	$324,450	$44,150
1969-1 qtr.	$ 353,500	$ 30,600	$ 268,100	$ 21,350	$ 85,400	$ 9,250
2	384,300	38,450	293,250	28,500	91,050	9,950
3	321,950	37,800	234,850	31,450	87,100	6,350
4	387,000	43,950	281,250	33,700	105,750	10,250
Total	$1,446,750	$150,800	$1,077,450	$115,000	$369,300	$35,800
1970-1 qtr.	$ 351,950	$ 48,700	$ 241,500	$ 37,900	$110,450	$10,800
2	348,000	54,800	236,200	44,550	111,800	10,250
3	269,350	51,600	176,050	44,350	93,300	7,250
4	269,650	49,000	173,600	38,750	96,050	10,250
Total	$1,238,950	$204,100	$ 827,350	$165,550	$411,600	$38,550
1971-1 qtr.	$ 228,500	$ 46,300	$ 142,900	$ 39,000	$ 85,600	$ 7,300
2	228,350	37,900	154,200	30,850	74,150	7,050
3	173,000	35,100	120,300	24,800	52,700	10,300
4	209,950	38,800	136,800	23,450	73,150	15,350
Total	$ 839,800	$158,100	$ 554,200	$118,100	$285,600	$40,000

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

SHIPMENTS OF MACHINE TOOLS

Quarterly and Yearly, 1972-1979

(Thousands of Dollars)

Period	TOTAL		Metal Cutting		Metal Forming	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
1972-1 qtr.	$ 183,750	$ 31,550	$ 121,900	$ 20,850	$ 61,850	$ 10,700
2	229,550	31,050	155,650	21,100	73,900	9,950
3	209,300	27,050	151,300	21,200	58,000	5,850
4	271,750	34,700	198,300	24,150	73,450	10,550
Total	$ 894,350	$124,350	$ 627,150	$ 87,300	$267,200	$ 37,050
1973-1 qtr.	$ 295,050	$ 35,500	$ 209,950	$ 29,400	$ 85,100	$ 6,100
2	347,500	43,200	243,750	36,050	103,750	7,150
3	296,650	48,950	207,450	37,850	89,200	11,100
4	383,900	50,250	273,900	35,400	110,000	14,850
Total	$1,323,100	$177,900	$ 935,050	$138,700	$388,050	$ 39,200
1974-1 qtr.	$ 378,550	$ 54,750	$ 269,850	$ 39,400	$108,700	$ 15,350
2	464,250	61,350	323,800	44,850	140,450	16,500
3	408,800	69,350	291,000	54,700	117,800	14,650
4	511,550	81,950	356,700	65,550	154,850	16,400
Total	$1,763,150	$267,400	$1,241,350	$204,500	$521,800	$ 62,900
1975-1 qtr.	$ 526,550	$109,700	$ 375,400	$ 78,400	$151,150	$ 31,300
2	554,750	101,400	443,450	84,550	111,300	16,850
3	467,150	99,650	361,850	79,050	105,300	20,600
4	484,150	108,350	367,400	88,550	116,750	19,800
Total	$2,032,600	$419,100	$1,548,100	$330,550	$484,500	$ 88,550
1976-1 qtr.	$ 446,550	$ 85,300	$ 334,150	$ 58,500	$112,400	$ 26,800
2	425,400	92,450	302,100	65,750	123,300	26,700
3	393,450	66,900	284,850	45,100	108,600	21,800
4	477,950	71,650	348,750	42,900	129,200	28,750
Total	$1,743,350	$316,300	$1,269,850	$212,250	$473,500	$104,050
1977-1 qtr.	$ 433,800	$ 63,100	$ 297,550	$ 38,550	$136,250	$ 24,550
2	526,300	58,400	365,650	45,150	160,650	13,250
3	476,000	48,050	359,300	35,850	116,700	12,200
4	594,100	81,000	447,350	61,400	146,750	19,600
Total	$2,030,200	$250,550	$1,469,850	$180,950	$560,350	$ 69,600
1978-1 qtr.	$ 620,900	$ 62,300	$ 459,650	$ 44,200	$161,250	$ 18,100
2	712,550	79,050	526,950	57,250	185,600	21,800
3	609,800	77,750	438,850	59,200	170,950	18,550
4	745,350	105,750	534,650	67,750	210,700	38,000
Total	$2,688,600	$324,850	$1,960,100	$228,400	$728,500	$ 96,450
1979-1 qtr.	$ 769,750	$ 88,300	$ 564,450	$ 69,000	$205,300	$ 19,300
2	869,050	109,150	648,100	87,650	220,950	21,500
3	802,800	97,050	611,350	78,500	191,450	18,550
4	1,023,700	116,750	781,600	89,400	242,100	27,350
Total	$3,465,300	$411,250	$2,605,500	$324,550	$859,800	$ 86,700

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

SHIPMENTS OF MACHINE TOOLS
Quarterly and Yearly, 1980 to Date
(Thousands of Dollars)

Period	TOTAL Domestic	TOTAL Foreign	Metal Cutting Domestic	Metal Cutting Foreign	Metal Forming Domestic	Metal Forming Foreign
1980-1 qtr.	$1,030,450	$115,700	$ 794,650	$ 86,750	$235,800	$ 28,950
2	1,037,750	155,550	802,500	122,850	235,250	32,700
3	915,200	133,850	727,800	102,650	187,400	31,200
4	1,100,850	202,400	881,050	162,550	219,800	39,850
Total	$4,084,250	$607,500	$3,206,000	$474,800	$878,250	$132,700
1981-1 qtr.	$1,077,400	$210,800	$ 862,250	$155,600	$215,150	$ 55,200
2	1,131,150	236,350	917,950	185,450	213,200	50,900
3	1,006,000	127,950	820,350	99,950	185,650	28,000
4	1,162,100	143,850	951,900	111,050	210,200	32,800
Total	$4,376,650	$718,950	$3,552,450	$552,050	$824,200	$166,900
1982-1 qtr.	$1,041,550	$112,650	$ 861,300	$ 71,750	$180,250	$ 40,900
2	911,850	96,600	735,300	75,350	176,550	21,250
3	676,200	107,200	550,700	89,750	125,500	17,450
4	568,750	89,600	451,300	59,300	117,450	30,300
Total	$3,198,350	$406,050	$2,598,600	$296,150	$599,750	$109,900
1983-1 qtr.	$ 430,800	$ 56,650	$ 329,800	$ 40,800	$101,000	$ 15,850
2	411,350	58,300	308,200	49,300	103,150	9,000
3	314,150	42,900	220,150	32,200	94,000	10,700
4	473,750	57,150	341,450	49,600	132,300	7,550
Total	$1,630,050	$215,000	$1,199,600	$171,900	$430,450	$ 43,100
1984-1 qtr.	$ 408,950	$ 40,550	$ 273,000	$ 25,100	$135,950	$ 15,450
2	521,600	50,700	373,550	28,250	148,050	22,450
3	527,000	41,850	377,250	24,300	149,750	17,550
4	635,050	60,150	460,050	45,000	175,000	15,150
Total	$2,092,600	$193,250	$1,483,850	$122,650	$608,750	$ 70,600
1985-1 qtr.	$ 482,750	$ 48,950	$ 319,900	$ 37,150	$162,850	$ 11,800
2	548,350	37,700	357,550	27,450	190,800	10,250
3	596,400	58,250	407,100	35,950	189,300	22,300
4	663,950	108,850	463,950	93,200	200,000	15,650
Total	$2,291,450	$253,750	$1,548,500	$193,750	$742,950	$ 60,000
1986-1 qtr.	$ 529,800	$ 67,500	$ 331,750	$ 55,200	$198,050	$ 12,300
2	686,900	64,100	519,850	49,500	167,050	14,600
3	485,150	64,200	369,200	49,500	115,950	14,700
4	604,200	76,650	463,900	51,400	140,300	25,250
Total	$2,306,050	$272,450	$1,684,700	$205,600	$621,350	$ 66,850
1987-1 qtr.	$ 420,850	$ 55,950	$ 311,100	$ 38,050	$109,750	$ 17,900
2	542,800	71,300	396,300	46,300	146,500	25,000
3	490,350	66,300	354,400	43,350	135,950	22,950
4	582,750	93,350	437,050	49,950	145,700	43,400
Total	$2,036,750	$286,900	$1,498,850	$177,650	$537,900	$109,250
1988-1 qtr.	$ 456,500	$ 60,000	$ 282,550	$ 35,300	$173,950	$ 24,700
2	476,750	74,400	298,450	40,900	178,300	33,500
3	502,850	66,350	352,650	38,650	150,200	27,700
4	666,200	96,050	466,450	59,600	199,750	36,450
Total	$2,102,300	$296,800	$1,400,100	$174,450	$702,200	$122,350

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipment and Backlog" (monthly).

NET NEW ORDERS FOR MACHINE TOOLS

Quarterly and Yearly, 1956-1963

(Thousands of Dollars)

	TOTAL		Metal Cutting		Metal Forming	
Period	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
1956-1 qtr.	$ 353,700	$ 39,050	$265,200	$ 33,200	$ 88,500	$ 5,850
2	291,700	26,300	222,550	20,300	69,150	6,000
3	284,150	34,800	215,400	27,150	68,750	7,650
4	242,700	26,450	179,050	20,650	63,650	5,800
Total	$1,172,250	$126,600	$882,200	$101,300	$290,050	$25,300
1957-1 qtr.	$ 221,300	$ 25,500	$168,850	$ 22,950	$ 52,450	$ 2,550
2	176,600	16,300	131,650	12,900	44,950	3,400
3	152,450	17,300	123,450	13,700	29,000	3,600
4	95,150	19,150	68,000	11,650	27,150	7,500
Total	$ 645,500	$ 78,250	$491,950	$ 61,200	$153,550	$17,050
1958-1 qtr.	$ 86,000	$ 17,600	$ 61,750	$ 14,400	$ 24,250	$ 3,200
2	78,300	22,650	57,050	15,150	21,250	7,500
3	79,800	15,950	55,450	8,700	24,350	7,250
4	107,200	21,250	73,700	13,300	33,500	7,950
Total	$ 351,300	$ 77,450	$247,950	$ 51,550	$103,350	$25,900
1959-1 qtr.	$ 139,100	$ 18,300	$ 97,900	$ 14,150	$ 41,200	$ 4,150
2	172,700	16,800	127,550	12,800	45,150	4,000
3	168,300	28,500	132,350	17,450	35,950	11,050
4	164,350	42,200	113,150	26,450	51,200	15,750
Total	$ 644,450	$105,800	$470,950	$ 70,850	$173,500	$34,950
1960-1 qtr.	$ 158,500	$ 44,750	$112,850	$ 35,700	$ 45,650	$ 9,050
2	124,250	55,900	85,600	39,100	38,650	16,800
3	114,950	56,550	90,200	41,150	24,750	15,400
4	129,950	60,100	86,350	44,350	43,600	15,750
Total	$ 527,650	$217,300	$375,000	$160,300	$152,650	$57,000
1961-1 qtr.	$ 140,550	$ 57,000	$ 95,150	$ 43,250	$ 45,400	$13,750
2	124,150	53,000	100,050	43,750	24,100	9,250
3	128,100	70,250	97,450	59,050	30,650	11,200
4	143,950	57,550	108,500	44,600	35,450	12,950
Total	$ 536,750	$237,800	$401,150	$190,650	$135,600	$47,150
1962-1 qtr.	$ 156,600	$ 42,300	$102,200	$ 26,200	$ 54,400	$16,100
2	167,400	45,300	123,850	30,850	43,550	14,450
3	147,950	36,400	108,850	23,550	39,100	12,850
4	190,100	30,550	133,950	22,650	56,150	7,900
Total	$ 662,050	$154,550	$468,850	$103,250	$193,200	$51,300
1963-1 qtr.	$ 196,150	$ 39,000	$140,250	$ 31,100	$ 55,900	$ 7,900
2	197,300	62,150	148,300	49,450	49,000	12,700
3	208,750	45,700	140,350	33,850	68,400	11,850
4	267,450	45,100	177,950	38,500	89,500	6,600
Total	$ 869,650	$191,950	$606,850	$152,900	$262,800	$39,050

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

NET NEW ORDERS FOR MACHINE TOOLS
Quarterly and Yearly, 1964-1971
(Thousands of Dollars)

Period	TOTAL		Metal Cutting		Metal Forming	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
1964-1 qtr.	$ 312,150	$ 64,000	$ 194,200	$ 52,900	$117,950	$11,100
2	428,100	63,200	248,150	46,300	179,950	16,900
3	293,750	52,850	209,900	40,700	83,850	12,150
4	314,050	50,800	209,000	38,000	105,050	12,800
Total	$1,348,050	$230,850	$ 861,250	$177,900	$486,800	$52,950
1965-1 qtr.	$ 338,850	$ 43,150	$ 253,000	$ 35,500	$ 85,850	$ 7,650
2	365,650	33,400	255,400	26,050	110,250	7,350
3	385,050	42,800	284,500	37,250	100,550	5,550
4	443,400	41,100	329,750	30,250	113,650	10,850
Total	$1,532,950	$160,450	$1,122,650	$129,050	$410,300	$31,400
1966-1 qtr.	$ 514,200	$ 57,450	$ 398,150	$ 46,450	$116,050	$11,000
2	497,800	54,350	384,400	38,500	113,400	15,850
3	457,650	38,100	364,950	30,550	92,700	7,550
4	414,800	41,300	335,600	31,300	79,200	10,000
Total	$1,884,450	$191,200	$1,483,100	$146,800	$401,350	$44,400
1967-1 qtr.	$ 327,800	$ 37,150	$ 268,600	$ 32,350	$ 59,200	$ 4,800
2	335,600	42,500	273,550	29,100	62,050	13,400
3	319,200	35,350	262,950	25,350	56,250	10,000
4	290,200	33,800	219,550	23,500	70,650	10,300
Total	$1,272,800	$148,800	$1,024,650	$110,300	$248,150	$38,500
1968-1 qtr.	$ 287,050	$ 36,800	$ 223,700	$ 31,750	$ 63,350	$ 5,050
2	307,300	44,850	246,400	34,750	60,900	10,100
3	303,800	31,900	232,200	24,250	71,600	7,650
4	422,300	40,100	257,600	28,700	164,700	11,400
Total	$1,320,450	$153,650	$ 959,900	$119,450	$360,550	$34,200
1969-1 qtr.	$ 376,550	$ 51,450	$ 260,000	$ 40,250	$116,550	$11,200
2	557,850	46,000	372,550	35,700	185,300	10,300
3	279,300	63,700	184,950	51,100	94,350	12,600
4	303,300	50,600	215,150	35,600	88,150	15,000
Total	$1,517,000	$211,750	$1,032,650	$162,650	$484,350	$49,100
1970-1 qtr.	$ 256,650	$ 48,750	$ 191,300	$ 39,750	$ 65,350	$ 9,000
2	185,550	46,100	131,950	41,850	53,600	4,250
3	150,400	41,750	106,900	34,150	43,500	7,800
4	140,750	42,600	76,600	28,800	64,150	13,800
Total	$ 733,350	$179,200	$ 506,750	$144,550	$226,600	$34,650
1971-1 qtr.	$ 151,000	$ 30,550	$ 95,500	$ 23,250	$ 55,500	$ 7,300
2	182,250	30,150	128,800	24,550	53,450	5,600
3	204,100	27,450	144,500	20,900	59,600	6,550
4	209,950	25,700	155,300	15,950	54,650	9,750
Total	$ 747,300	$113,850	$ 524,100	$ 84,650	$223,200	$29,200

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

NET NEW ORDERS FOR MACHINE TOOLS

Quarterly and Yearly, 1972-1979

(Thousands of Dollars)

Period	TOTAL		Metal Cutting		Metal Forming	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
1972-1 qtr.	$ 242,050	$ 33,550	$ 180,550	$ 27,100	$ 61,500	$ 6,450
2	284,750	34,900	193,800	28,350	90,950	6,550
3	301,550	51,550	210,900	42,800	90,650	8,750
4	417,100	46,550	292,000	33,450	125,100	13,100
Total	$1,245,450	$166,550	$ 877,250	$131,700	$368,200	$ 34,850
1973-1 qtr.	$ 558,150	$ 73,850	$ 370,150	$ 55,850	$188,000	$ 18,000
2	610,550	67,550	395,450	52,550	215,100	15,000
3	512,850	87,250	358,450	68,900	154,400	18,350
4	586,050	116,400	426,350	97,750	159,700	18,650
Total	$2,267,600	$345,050	$1,550,400	$275,050	$717,200	$ 70,000
1974-1 qtr.	$ 644,500	$107,700	$ 509,750	$ 88,100	$134,750	$ 19,600
2	737,950	109,900	592,550	83,650	145,400	26,250
3	536,300	95,200	394,100	70,900	142,200	24,300
4	266,500	85,000	219,250	58,750	47,250	26,250
Total	$2,185,250	$397,800	$1,715,650	$301,400	$469,600	$ 96,400
1975-1 qtr.	$ 188,350	$ 49,250	$ 147,700	$ 28,550	$ 40,650	$ 20,700
2	276,800	68,950	201,050	39,800	75,750	29,150
3	293,750	46,700	209,600	31,750	84,150	14,950
4	305,150	47,800	222,150	35,300	83,000	12,500
Total	$1,064,050	$212,700	$ 780,500	$135,400	$283,550	$ 77,300
1976-1 qtr.	$ 354,500	$ 58,800	$ 259,950	$ 45,800	$ 94,550	$ 13,000
2	452,700	43,900	322,700	31,350	130,000	12,550
3	527,800	69,500	383,500	55,900	144,300	13,600
4	626,450	69,550	510,450	52,500	116,000	17,050
Total	$1,961,450	$241,750	$1,476,600	$185,550	$484,850	$ 56,200
1977-1 qtr.	$ 603,900	$ 63,550	$ 443,850	$ 45,150	$160,050	$ 18,400
2	692,250	78,300	522,600	61,100	169,650	17,200
3	650,700	75,150	435,300	60,900	215,400	14,250
4	762,800	68,700	578,950	54,200	183,850	14,500
Total	$2,709,650	$285,700	$1,980,700	$221,350	$726,950	$ 64,350
1978-1 qtr.	$ 847,300	$ 92,750	$ 646,250	$ 77,600	$201,050	$ 15,150
2	1,013,250	116,700	789,550	97,000	223,700	19,700
3	953,850	73,800	720,700	56,250	233,150	17,550
4	1,129,700	121,150	886,650	101,450	243,050	19,700
Total	$3,944,100	$404,400	$3,043,150	$332,300	$900,950	$ 72,100
1979-1 qtr.	$1,322,800	$148,600	$1,031,550	$126,700	$291,250	$ 21,900
2	1,189,000	167,450	963,300	120,250	225,700	47,200
3	1,171,850	181,350	969,400	151,100	202,450	30,250
4	1,172,850	267,550	901,550	231,250	271,300	36,300
Total	$4,856,500	$764,950	$3,865,800	$629,300	$990,700	$135,650

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

NET NEW ORDERS FOR MACHINE TOOLS

Quarterly and Yearly, 1980 to Date

(Thousands of Dollars)

Period	TOTAL		Metal Cutting		Metal Forming	
	Domestic	Foreign	Domestic	Foreign	Domestic	Foreign
1980-1 qtr.	$1,331,950	$185,500	$1,057,900	$149,900	$274,050	$ 35,600
2	1,210,050	125,300	1,054,300	87,800	155,750	37,500
3	825,350	92,150	659,050	69,250	166,300	22,900
4	872,200	111,800	724,250	82,300	147,950	29,500
Total	$4,239,550	$514,750	$3,495,500	$389,250	$744,050	$125,500
1981-1 qtr.	$ 809,950	$110,400	$ 615,250	$ 91,350	$194,700	$ 19,050
2	723,600	143,400	559,950	101,250	163,650	42,150
3	530,650	62,800	408,100	47,150	122,550	15,650
4	498,450	65,600	362,500	42,550	135,950	23,050
Total	$2,562,650	$382,200	$1,945,800	$282,300	$616,850	$ 99,900
1982-1 qtr.	$ 432,300	$ 74,500	$ 328,400	$ 56,450	$103,900	$ 18,050
2	303,050	79,600	216,450	58,300	86,600	21,300
3	237,300	42,650	154,000	29,450	83,300	13,200
4	288,700	39,650	190,750	30,650	97,950	9,000
Total	$1,261,350	$236,400	$ 889,600	$174,850	$371,750	$ 61,550
1983-1 qtr.	$ 285,550	$ 29,300	$ 205,850	$ 18,250	$ 79,700	$ 11,050
2	366,700	32,400	250,300	19,000	116,400	13,400
3	439,450	28,700	305,900	16,300	133,550	12,400
4	466,500	47,550	307,400	28,650	159,100	18,900
Total	$1,558,200	$137,950	$1,069,450	$ 82,200	$488,750	$ 55,750
1984-1 qtr.	$ 551,900	$ 48,550	$ 376,100	$ 36,650	$175,800	$ 11,900
2	654,650	109,750	410,750	88,450	243,900	21,300
3	734,950	65,250	439,150	53,850	295,800	11,400
4	689,550	61,200	473,550	37,300	216,000	23,900
Total	$2,631,050	$284,750	$1,699,550	$216,250	$931,500	$ 68,500
1985-1 qtr.	$ 663,250	$ 65,000	$ 475,500	$ 53,000	$187,650	$ 12,000
2	582,450	58,950	430,150	45,550	152,300	13,400
3	465,350	93,100	338,800	65,950	126,550	27,150
4	551,100	48,900	407,700	36,450	143,400	12,450
Total	$2,262,150	$265,950	$1,652,150	$200,950	$610,000	$ 65,000
1986-1 qtr.	$ 570,000	$ 45,750	$ 431,450	$ 32,050	$138,550	$ 13,700
2	536,800	63,800	382,450	52,200	154,350	11,600
3	387,900	71,750	297,800	46,250	90,100	25,500
4	388,650	60,650	264,850	37,200	123,800	23,450
Total	$1,883,350	$241,950	$1,376,550	$167,700	$506,800	$ 74,250
1987-1 qtr.	$ 396,250	$ 67,450	$ 291,550	$ 34,550	$104,700	$ 32,900
2	463,550	57,600	303,600	35,700	159,950	21,900
3	412,450	75,400	291,600	32,950	120,850	42,450
4	558,250	87,850	407,700	53,800	150,550	34,050
Total	$1,830,500	$288,300	$1,294,450	$157,000	$536,050	$131,300
1988-1 qtr.	$ 746,950	$103,050	$ 597,850	$ 68,400	$149,100	$ 34,650
2	817,600	142,900	562,750	113,700	254,850	29,150
3	778,750	143,900	599,800	115,200	178,950	28,700
4	721,800	135,900	555,350	94,800	166,450	41,100
Total	$3,065,100	$525,750	$2,315,750	$392,150	$749,350	$133,600

Source: NMTBA, "Industry Estimate of Machine Tool New Orders, Cancellations, Shipments and Backlog" (monthly).

SHIPMENTS OF MACHINE TOOL PRODUCTS

By Type of Machine, 1979 to Date

(Millions of Dollars)

	1979	1980	1981	1982	1983	1984	1985	1986
MACHINE TOOLS TOTAL	$5,762.3	$6,701.5	$7,206.1	$5,538.6	$3,664.1	$4,177.6	$4,353.2	$4,369.2
METAL CUTTING TOTAL	$4,127.5	$4,952.3	$5,554.0	$4,154.7	$2,544.9	$2,815.0	$2,920.7	$2,939.7
Boring Machines	169.9	200.0	227.0	198.7	103.2	102.7	88.1	85.1
Drilling Machine	167.1	188.8	155.0	67.3	36.2	40.1	47.8	44.6
Gear Cutting	104.6	124.7	132.5	87.3	40.3	41.6	56.5	57.8
Grinding & Polishing Machines (a)	464.5	553.8	623.3	515.3	331.6	378.3	412.4	412.4
Lathes	675.7	823.0	865.3	523.6	306.5	300.6	313.0	265.3
Milling Machines	259.3	(322.0)	390.4	264.5	145.4	184.6	185.5	154.0
Machining Centers	(d)	(d)	(d)	365.7	184.5	215.3	230.9	227.8
Station Type Machines	(d)	(d)	(d)	735.4	271.9	330.3	388.3	516.1
Other Machine Tools (b,d)	1,279.3	1,620.8	1,838.3	336.3	253.3	257.1	279.7	234.8
Parts (c)	813.7	877.3	1,038.2	891.9	694.6	794.6	732.4	740.1
Not Specified by Kind	(193.3)	(241.8)	(284.0)	168.7	177.5	169.8	186.1	201.8
METAL FORMING TOTAL	1,634.8	1,749.2	1,652.1	1,383.9	1,119.2	1,362.6	1,432.5	1,429.5
Punching, Shearing, Bending & Forming	389.9	429.0	444.1	317.3	242.3	355.4	376.1	303.3
Presses	449.5	498.5	422.7	369.2	176.5	247.7	281.5	306.6
Other (b)	264.4	238.9	221.4	217.0	168.9	178.4	200.1	219.5
Parts (c)	482.5	530.8	498.4	380.0	430.7	482.7	480.2	505.8
Not Specified by Kind	48.5	52.0	65.5	100.5	100.8	98.4	94.7	94.2

(a) Excluding Gear-Tooth Grinding, Honing, Lapping, Polishing and Buffing Machines; for 1979 - 86 honing and lapping machines are included.

(b) Including those designed primarily for Home Workshops, Laboratories, etc.

(c) Data represents parts sold separately and rebuilt machine tools.

(d) For 1979-1981, machining centers and station type machines are included in "Other Machine Tools."

( ) Indicates standard errors exceeding 15%.

This table, includes machine tool products only—those produced as "primary" products of the machine tool industry and as "secondary" products by other industries.

Sources: U.S. Bureau of the Census; "Census of Manufacturers, Metal Working Machinery and Equipment" and "Annual Survey of Manufacturers."

SHIPMENTS OF MACHINE TOOLS
Metal Cutting and Metal Forming
(Values in Thousands of Dollars)

	Total Shipments		Machines Valued at $2,500 or More		Machines Valued Less Than $2,500	
Year	Units	Value	Units	Value	Units	Value
1959	196,701	$ 679,538	65,892	$ 648,368	130,809	$ 31,170
1960	183,142	777,692	62,225	749,900	120,917	27,792
1961	170,982	764,453	57,503	737,051	113,479	27,402
1962	190,288	867,269	67,678	837,370	122,610	29,899
1963	198,571	967,133	73,255	934,485	125,316	32,648
1964	212,257	1,209,076	81,020	1,176,645	131,237	32,431
1965	250,492	1,457,685	93,350	1,418,294	157,142	39,391
1966	321,705	1,712,849	112,654	1,658,651	209,051	54,198
1967	311,472	1,869,298	117,651	1,820,197	193,821	49,101
1968	301,114	1,722,727	95,927	1,668,852	205,187	53,875
1969	308,273	1,692,188	92,148	1,631,239	216,125	60,949
1970	252,431	1,551,777	73,517	1,501,454	178,914	50,323
1971	211,432	1,057,870	51,843	1,009,389	159,589	48,481
1972	267,065	1,269,302	71,655	1,220,521	195,410	48,781
1973	307,680	1,787,850	94,833	1,724,719	212,847	63,131
1974	337,799	2,165,937	106,016	2,096,198	231,783	69,739
1975	280,341	2,406,082	92,731	2,353,936	187,610	52,146
1976	270,875	2,178,265	82,937	2,119,846	187,938	58,419
1977	284,583	2,453,423	92,270	2,393,964	192,313	59,459
1978	327,460	3,142,594	87,589	3,050,209	239,871	92,385
1979	345,218	4,064,045	89,586E	3,934,566E	255,632E	129,479E
1980	323,899	4,812,349	88,428E	4,674,068E	235,471E	138,281E
1981	301,313	5,111,253	87,981E	5,007,848E	213,332E	103,405E
1982	178,638	3,804,250	53,141E	3,738,397E	125,497E	65,853E
1983	150,837	2,144,849	43,199E	1,986,212E	107,638E	58,637E
1984	162,438	2,426,382	49,511E	2,362,268E	112,927E	64,114E
1985	147,147	2,682,201	50,108E	2,623,563E	97,039E	58,639E
1986(r)	134,485	2,709,800	45,589E	2,655,632E	88,896E	54,168E
1987(r)	139,008E	2,582,699E	41,931E	2,527,418E	97,077E	55,281E
1988(p)	154,973E	2,635,897E	48,668E	2,576,767E	106,305E	59,130E

p - Preliminary. r - Revised. NA - Not Available. E - Estimated by NMTBA.

(a) Includes some metalworking machinery which are not machine tools for 1959 through 1967. These metalworking machines are excluded after 1967.

(b) Data prior to 1978 are for machines valued over and under $1,000.

NOTE: Prior to 1967, this chart includes some metalworking machines that were not machine tools. These machines have not been included in the data after to 1967.

Source: U.S. Dept. of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

Data on shipments of complete machine tools published in the "Current Industrial Reports" series of the Census tend to vary slightly from those published by NMTBA. There are several reasons for the difference; among them is the fact that NMTBA reports are extended to a 100 percent estimate based on earlier coverage by the "Current Industrial Reports" series. Refer to this chapter's introduction for a detailed explanation of the various sources of statistics for machine tools.

SHIPMENTS OF METAL CUTTING MACHINE TOOLS

Units and Value, 1959 to Date

(Values in Thousands of Dollars)

	Total Shipments		Machines Valued at $2,500 or More (a)		Machines Valued Less Than $2,500 (a)	
Year	Units	Value	Units	Value	Units	Value
1959	143,380	$ 468,777	45,212	$ 447,009	98,168	$ 21,768
1960	133,511	539,340	42,914	520,294	90,597	19,046
1961	124,260	531,343	40,363	512,424	83,897	18,919
1962	138,855	626,833	47,942	606,297	90,913	20,536
1963	139,896	657,607	50,353	635,157	89,543	22,450
1964	153,831	874,467	58,714	852,392	95,117	22,075
1965	184,168	1,047,823	68,005	1,021,331	116,163	26,492
1966	242,698	1,231,907	80,673	1,194,149	162,025	37,758
1967	236,167	1,373,178	86,014	1,336,419	150,153	36,759
1968	225,778	1,309,361	70,505	1,271,876	155,273	37,485
1969	229,974	1,242,550	65,199	1,198,504	164,775	44,046
1970	188,491	1,097,718	49,314	1,061,066	139,177	36,652
1971	157,099	714,454	32,443	677,841	124,656	36,613
1972	207,290	857,964	47,846	821,899	159,444	36,065
1973	252,237	1,224,715	63,685	1,175,058	188,552	49,657
1974	272,811	1,525,575	69,060	1,466,671	203,751	58,904
1975	229,169	1,790,360	65,883	1,750,797	163,286	39,563
1976	212,757	1,592,216	54,974	1,546,631	157,783	45,585
1977	220,017	1,791,293	59,500	1,743,724	160,517	47,569
1978	257,647	2,334,425	58,116	2,265,541	199,531	68,884
1979	263,019	3,037,205	59,453E	2,943,225E	203,566E	93,980E
1980	248,563	3,716,370	62,185E	3,612,645E	186,378E	103,725E
1981	234,647	4,046,940	66,076E	3,978,970E	168,571E	67,970E
1982	130,434	2,940,626	35,060E	2,899,429E	95,374E	41,197E
1983	100,764	1,564,204	27,088E	1,532,210E	73,676E	31,994E
1984	105,740	1,688,296	31,737E	1,654,269E	74,003E	34,027E
1985	93,802	1,877,289	31,425E	1,846,840E	62,377E	30,449E
1986(r)	89,565	1,911,628	27,677E	1,880,546E	61,888E	31,082E
1987(r)	91,363	1,780,551	25,098E	1,749,810E	66,265E	30,741E
1988(p)	101,287	1,642,851	28,551E	1,608,995E	72,736E	33,856E

p - Preliminary. r - Revised. E - Estimated by NMTBA.

(a) Data prior to 1978 are for machines valued over and under $1,000.

Source: U.S. Dept. of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly & Annual Summaries).

SHIPMENTS OF METAL FORMING MACHINE TOOLS

Units and Value, 1959 to Date

(Values in Thousands of Dollars)

	Total Shipments		Machines Valued at $2,500 or More (a)		Machines Valued Less Than $2,500 (a)	
Year	Units	Value	Units	Value	Units	Value
1959	53,321	$ 210,761	20,680	$ 201,359	32,641	$ 9,402
1960	49,631	238,352	19,311	229,606	30,320	8,746
1961	46,722	233,110	17,140	224,627	29,582	8,463
1962	51,433	240,436	19,736	231,073	31,697	9,363
1963	58,675	309,526	22,902	299,328	35,773	10,198
1964	58,426	334,609	22,306	324,253	36,120	10,356
1965	66,324	409,862	25,345	396,963	40,979	12,899
1966	79,007	480,942	31,981	464,502	47,026	16,440
1967	75,305	496,120	31,637	483,778	43,668	12,342
1968	75,336	413,366	25,422	396,976	49,914	16,390
1969	78,299	449,638	26,949	432,735	51,350	16,903
1970	63,940	454,059	24,203	440,388	39,737	13,671
1971	54,333	343,416	19,400	331,548	34,933	11,868
1972	59,775	411,338	24,107	398,622	35,668	12,716
1973	55,443	563,135	31,148	549,661	24,295	13,474
1974	64,988	640,362	36,956	629,527	28,032	10,835
1975	51,172	615,722	26,848	603,139	24,324	12,583
1976	58,118	586,049	27,963	573,215	30,155	12,834
1977	64,566	662,130	32,770	650,240	31,796	11,890
1978	69,813	808,169	29,473	784,668	40,340	23,501
1979	82,199	1,026,840	30,133	991,341	52,066	35,499
1980	75,336	1,095,979	26,243	1,061,423	49,093	34,556
1981	66,666	1,064,313	21,905	1,028,878	44,761	35,435
1982	48,204	863,624	18,081	838,968	30,123	24,656
1983	50,073	580,645	16,111	554,002	33,962	26,643
1984	56,698	738,086	17,774	707,999	38,924	30,087
1985	53,345	804,912	18,683	776,722	34,662	28,190
1986(r)	44,920	798,172	17,912	775,086	27,008	22,086
1987(r)	47,645	802,148	16,833	777,608	30,812	24,540
1988(p)	53,686E	993,046E	20,117E	967,772E	33,569E	25,274E

p - Preliminary. r - Revised. E - Estimated by NMTBA.

(a) Data prior to 1978 are for machines valued over and under $1,000.

NOTE: Prior to 1967, this chart includes some metalworking machines that were not machine tools. These machines have not been included in the data after to 1967.

Source: U.S. Dept. of Commerce, "Current Industrial Reports, Series, MQ-35W, Metalworking Machinery" (Quarterly & Annual Summaries).

SHIPMENTS OF METAL CUTTING MACHINE TOOLS

By Class of Product, 1959 to Date

(Millions of Dollars)

Year	TOTAL	Boring Machines	Drilling Machines	Gear Cutting and Finishing	Grinding and Polishing	Lathes	Milling Machines	Other Metal Cutting Machines
1959	$ 468.8	$ 46.2	$ 33.4	$ 24.7	$ 93.8	$119.5	$ 73.3	$ 77.9
1960	539.3	46.9	38.9	34.3	117.0	135.4	79.4	87.4
1961	531.3	51.5	36.8	36.4	121.0	126.5	73.7	85.4
1962	626.8	61.4	53.2	35.8	127.9	152.3	95.8	100.4
1963	657.6	67.9	52.0	39.5	136.8	154.8	106.1	100.5
1964	874.5	74.1	72.3	47.1	175.9	198.1	125.8	181.2
1965	1,047.8	91.9	83.2	55.7	213.6	234.8	144.0	224.7
1966	1,231.9	110.9	105.9	59.0	235.9	286.5	201.7	232.0
1967	1,373.2	117.8	122.8	63.9	247.8	334.0	234.3	252.6
1968	1,309.4	93.7	67.7	68.2	235.1	316.2	234.1	294.4
1969	1,242.6	80.2	67.5	65.6	227.3	288.9	184.6	328.5
1970	1,097.7	62.1	70.9	66.3	219.4	240.1	110.0	329.0
1971	714.5	35.8	43.4	50.1	142.9	174.9	54.4	212.7
1972	858.0	54.1	65.8	50.3	151.0	203.2	81.7	251.9
1973	1,224.7	66.7	90.5	55.4	209.6	299.0	104.6	398.9
1974	1,525.6	81.4	77.9	66.2	249.9	370.2	137.7	542.3
1975	1,790.4	83.9	92.9	65.1	273.2	464.2	134.0	677.1
1976	1,592.2	77.8	100.4	56.0	246.8	430.3	134.4	546.6
1977	1,791.3	84.9	107.2	61.4	273.1	436.3	160.2	668.1
1978	2,334.4	117.7	152.4	102.7	348.6	535.9	194.3	882.9
1979	3,037.2	177.4	150.5	111.2	474.9	650.3	279.8	1,193.1
1980	3,716.4	192.0	166.9	130.3	555.8	827.0	339.3	1,505.2
1981	4,046.9	231.0	140.0	133.1	615.4	816.8	436.6	1,674.2
1982	2,940.6	193.8	65.9	86.5	486.7	507.3	265.6	1,334.9
1983	1,564.2	95.8	41.1	35.8	280.8	320.9	146.5	643.4
1984	1,688.3	96.1	37.2	40.0	335.6	307.6	179.9	689.5
1985	1,877.3	85.1	43.8	51.8	415.0	318.7	180.6	782.3
1986(r)	1,911.6	83.9	40.0	57.3	419.7	262.0	169.2	879.5
1987(r)	1,780.6	106.8	46.5	52.6	379.5	287.3	213.6	694.2
1988(p)	1,642.9	86.5	49.0	48.9	341.5	356.2	178.5	655.0

p - Preliminary. r - Revised.

Note: Other Metal Cutting Machines include machining centers, transfer machines, shapers, sawing and cutoff machines, and other metal cutting machines not classified elsewhere. For a breakdown by type, refer to pages detailing shipments of these machines also appearing in this chapter.

Individual items may not add to totals due to rounding.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF METAL CUTTING MACHINE TOOLS
By Class of Product, 1959 to Date
(Percentage of Dollar Value)

Year	Boring Machines	Drilling Machines	Gear Cutting and Finishing	Grinding and Polishing	Lathes	Milling Machines	Other Metal Cutting Machines
1959	9.9%	7.1%	5.3%	20.0%	25.5%	15.6%	16.6%
1960	8.7	7.2	6.4	21.7	25.1	14.7	16.2
1961	9.7	6.9	6.9	22.8	23.8	13.9	16.1
1962	9.8	8.5	5.7	20.4	24.3	15.3	16.0
1963	10.3	7.9	6.0	20.8	23.5	16.1	15.3
1964	8.5	8.3	5.4	20.1	22.7	14.4	20.7
1965	8.8	7.9	5.3	20.4	22.4	13.7	21.4
1966	9.0	8.6	4.8	19.1	23.3	16.4	18.8
1967	8.6	9.9	4.7	18.0	24.3	17.1	18.4
1968	7.2	5.2	5.2	18.0	24.1	17.9	22.5
1969	6.5	5.4	5.3	18.3	23.2	14.9	26.4
1970	5.7	6.5	6.0	20.0	21.9	10.0	30.0
1971	5.0	6.1	7.0	20.0	24.5	7.6	29.8
1972	6.3	7.7	5.9	17.6	23.7	9.5	29.4
1973	5.4	7.4	4.5	17.1	24.4	8.5	32.6
1974	5.3	5.1	4.3	16.4	24.3	9.0	35.6
1975	4.7	5.2	3.6	15.3	25.9	7.5	37.8
1976	4.9	6.3	3.5	15.5	27.0	8.4	34.3
1977	4.7	6.0	3.4	15.2	24.4	8.9	37.3
1978	5.0	6.5	4.4	14.9	23.0	8.3	37.9
1979	5.8	5.0	3.7	15.6	21.4	9.2	39.3
1980	5.2	4.5	3.5	15.0	22.3	9.1	40.5
1981	5.7	3.5	3.3	15.2	20.2	10.8	41.4
1982	6.6	2.2	2.9	16.6	17.3	9.0	45.4
1983	6.1	2.6	2.3	18.0	20.5	9.4	41.1
1984	5.7	2.2	2.5	19.9	18.2	10.7	40.8
1985	4.5	2.3	2.8	22.1	17.0	9.6	41.7
1986(r)	4.4	2.1	3.0	22.0	13.7	8.4	46.4
1987(r)	6.0	2.6	3.0	21.3	16.1	12.0	39.0
1988(p)	5.3	3.0	3.0	21.7	16.4	10.9	39.9

p - Preliminary. r - Revised

Individual percentages may not add to 100% due to rounding.

Source: U.S. Department of Commerce, "Current Industrial Report, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF METAL FORMING MACHINE TOOLS

By Type of Machine, 1959 to Date

(Millions of Dollars)

Year	TOTAL	Presses (a)	Forging Machines (b)	Punching and Shearing Machines	Bending and Forming Machines	Other Metal Forming
1959	$ 210.8	$ 84.6	$17.9	$ 29.9	$ 35.7	$ 42.7
1960	238.4	105.0	21.0	32.9	34.3	45.2
1961	233.1	111.3	15.8	33.3	32.5	40.2
1962	240.4	109.5	23.7	34.5	29.0	43.7
1963	309.5	136.0	22.3	42.8	45.2	63.2
1964	334.6	169.5	23.1	33.2	42.7	66.1
1965	409.9	209.2	32.8	43.9	49.4	74.6
1966	480.9	253.3	32.7	49.7	51.0	94.2
1967	496.1	240.1	29.6	56.9	57.4	112.1
1968	413.4	199.1	31.9	57.1	64.4	60.9
1969	449.6	223.7	32.0	53.6	66.0	74.3
1970	454.1	239.6	36.6	47.7	59.8	70.4
1971	343.4	166.5	37.0	41.4	53.3	45.2
1972	411.3	166.7	34.5	62.5	67.9	79.8
1973	563.1	242.7	38.7	75.8	94.5	111.4
1974	640.4	307.0	40.1	86.1	113.0	94.2
1975	615.7	269.4	39.5	121.0	115.4	70.4
1976	586.0	223.6	52.2	120.0	118.8	71.4
1977	662.1	260.7	55.1	130.6	137.2	78.5
1978	808.2	350.9	59.3	146.6	147.7	103.7
1979	1,026.8	434.0	84.7	181.2	183.4	143.5
1980	1,096.0	440.8	73.8	204.2	214.9	162.3
1981	1,064.3	429.6	79.0	206.1	212.8	136.8
1982	863.6	344.8	79.0	142.2	166.5	131.1
1983	580.6	160.8	48.0	120.1	138.6	113.1
1984	738.1	230.1	29.0	139.2	177.9	161.9
1985	804.9	254.0	35.4	144.0	178.4	193.1
1986(r)	798.2	293.1	36.7	122.3	169.9	176.2
1987(r)	802.1	264.3	42.7	162.2	169.2	163.7
1988(p)	993.0	301.9	52.5E	187.7	200.5	250.4

p - Preliminary. r - Revised. E - Estimated by NMTBA.

(a) Includes forging presses prior to 1979.
(b) Includes forging presses from 1979 to date.

NOTE: Prior to 1967, "Other Metal Forming" includes some metalworking machines that were not machine tools. These machines are not included in the data after 1967.

Individual items may not add to totals due to rounding.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF METAL FORMING MACHINE TOOLS

By Type of Machine, 1959 to Date

(Percentage of Dollar Value)

Year	Presses (a)	Forging Machines (b)	Punching and Shearing Machines	Bending and Forming Machines	Other Metal Forming
1959	40.1%	8.5%	14.2%	16.9%	20.3%
1960	44.0	8.8	13.8	14.4	19.0
1961	47.7	6.8	14.3	13.9	17.3
1962	45.5	9.9	14.3	12.1	18.2
1963	44.0	7.2	13.8	14.6	20.4
1964	50.7	6.9	9.9	12.8	19.7
1965	51.0	8.0	10.7	12.1	18.2
1966	52.7	6.8	10.3	10.6	19.6
1967	48.4	5.9	11.5	11.6	22.6
1968	48.2	7.7	13.8	15.6	14.7
1969	49.8	7.1	11.9	14.7	16.5
1970	52.7	8.1	10.5	13.2	15.5
1971	48.5	10.8	12.0	15.5	13.2
1972	40.5	8.4	15.2	16.5	19.4
1973	43.1	6.9	13.4	16.8	19.8
1974	47.9	6.3	13.4	17.7	14.7
1975	43.8	6.4	19.7	18.7	11.4
1976	38.2	8.9	20.5	20.3	12.2
1977	39.4	8.3	19.7	20.7	11.9
1978	43.4	7.3	18.1	18.3	12.9
1979	42.3	8.2	17.6	17.9	14.0
1980	40.2	6.7	18.6	19.6	14.8
1981	40.4	7.4	19.4	20.0	12.9
1982	39.9	9.1	16.5	19.3	15.2
1983	27.7	8.3	20.7	23.9	19.5
1984	31.2	3.9	18.9	24.1	21.9
1985	31.6	4.4	17.9	22.2	24.0
1986(r)	36.7	4.6	15.3	21.3	22.1
1987(r)	33.0	5.3	20.2	21.1	20.4
1988(p)	30.4	5.3E	18.9	20.2	25.2

p - Preliminary. r - Revised. E - Estimated by NMTBA.

(a) Includes forging presses prior to 1979.
(b) Includes forging presses from 1979 to date.

NOTE: Prior to 1967, "Other Metal Forming" includes some metalworking machines that were not machine tools. These machines are not included in the data after 1967.

Individual percentages may not add to 100% due to rounding.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF NUMERICALLY CONTROLLED MACHINE TOOLS

By Type of Machine, 1970 to Date

(Values in Millions of Dollars)

Type of Machine	Year	SHIPMENTS of Machines and Controls		Year	SHIPMENTS of Machines and Controls	
		Units	Value		Units	Value
TOTAL						
	1970(a)	1,901	$ 209.0	1982(g)	6,066	$1,126.6
	1971(a)	1,238	153.2	1983(g)	4,781	677.1
	1972(a)	1,630	170.1	1984(g)	5,581	739.5
	1973(a)	2,865	272.1	1985(g)	5,518	792.0
	1974(a)	4,210	378.7	1986(r)	5,901	843.5
	1975(a)	4,136	504.7	1987(r)	6,084	907.0
	1976(a)	3,856	501.0	1988(p)	6,158	921.8
	1977(a)	4,482	496.7			
	1978(a)	5,688	649.2			
	1979(g)	7,925	1,014.6			
	1980(g)	9,984	1,371.7			
	1981(g)	8,945	1,467.3			
Boring and Drilling Machines						
	1970	390	42.5	1982	231	110.7
	1971	230	29.7	1983	69	37.1
	1972	202	29.4	1984	119	45.1
	1973	454	45.8	1985(b)	89	35.4
	1974	362	45.4	1986(b)	117	45.9
	1975	253	50.4	1987(r,b)	120	55.2
	1976	317	48.8	1988(p)	108	45.2
	1977	389	53.0			
	1978	448	69.3			
	1979	423	87.3			
	1980	610	125.9			
	1981	748	173.0			
Lathes						
	1970	507	55.3	1982	1,489	333.4
	1971	428	50.4	1983	1,202	224.6
	1972	570	67.1	1984	1,497	207.8
	1973(c)	1,031	95.2	1985	1,420	225.2
	1974	1,381	137.3	1986	1,163	188.1
	1975	1,640	212.7	1987(r)	1,626	225.6
	1976	1,321	205.9	1988(p)	1,762	226.1
	1977	1,178	195.3			
	1978	1,464	237.2			
	1979	2,362	347.7			
	1980	2,739	481.2			
	1981	2,021	441.4			
Milling Machines (d)						
	1970	150	23.4	1982	1,061	185.6
	1971	105	12.6	1983	1,091	108.9
	1972	229	15.8	1984	1,434	108.9
	1973	240	16.1	1985	1,087	99.6
	1979	2,045	93.8	1986(r)	1,282	114.2
	1980	2,600	162.7	1987(r)	818	113.2
	1981	1,763	190.6	1988(p)	654	84.3

(Continued)

SHIPMENTS OF NUMERICALLY CONTROLLED MACHINE TOOLS

By Type of Machine, 1970 to Date

(Values in Millions of Dollars)

Type of Machine	Year	SHIPMENTS of Machines and Controls		Year	SHIPMENTS of Machines and Controls	
		Units	Value		Units	Value
Machining Centers						
	1970	651	$ 68.9	1982(i)	1,396	$357.6
	1971	344	46.6	1983(i)	1,005	182.9
	1972	475	45.3	1984	1,237	213.2
	1973	1,162	115.1	1985	1,077	214.7
	1974	1,692	163.1	1986(r)	936	–213.6
	1975	1,460	196.8	1987(r)	1,036	193.8
	1976	1,225	178.4	1988(p)	1,277	273.7
	1977	1,201	175.0			
	1978	1,486	246.0			
	1979	1,953	356.5			
	1980	2,132	413.0			
	1981	2,081	482.7			
Grinding and Polishing Machines						
	1980	271	32.9	1985	724	122.4
	1981	645	46.7	1986	809	144.1
	1982	590	49.6	1987	765	135.7
	1983	494	42.7	1988(p)	725	110.1
	1984	546	65.9			
All Other Metal Cutting and Metal Forming Type Machine Tools						
	1970	203	19.0	1982(g)	1,299	89.6
	1971	131	13.9	1983(g)	920	80.9
	1972	154	12.6	1984(g)	748	98.6
	1973(a,e)	17	5.0	1985(g)	1,121	94.7
	1974(a,f)	775	32.8	1986(r)	1,594	137.8
	1975(a,f)	783	44.8	1987(r)	1,719	183.4
	1976(a,f)	993	67.9	1988(p)	1,632	182.4
	1977(a,f)	1,714	73.4			
	1978(a,f)	2,290	96.7			
	1979(g)	936	100.7			
	1980(g)	1,632	156.0			
	1981(g)	1,667	133.0			

p - Preliminary. *r* - Revised.

(a) Metal forming NC data are not included.
(b) "Drilling Machines" are included in the "All Other" category.
(c) Includes data for grinding and polishing machines.
(d) For 1974-1978 data were included in the "All Other" category.
(e) For 1973 only, grinding and polishing machines are reported with lathes and are not included in the "All Other" category.
(f) Includes milling machines and grinding and polishing machines.
(g) Includes data for punching, shearing, bending, and forming machines; all other metal forming NC data withheld to avoid disclosure.
(h) The data for 1982 and 1983 should have been reported in "Machining Centers." It is possible that the data for 1970 through 1981 was misclassified and/or overstated.
(i) The data for 1982 and 1983 reflect the addition of misclassified data, originally reported in "Drilling Machines."

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF BORING AND DRILLING MACHINES

Units and Value, 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987	1988
UNITS								
TOTAL	28,894	18,040	13,549	12,526	10,259	8,516	7,677	10,131
Boring Machines	1,699	994	455	475	428	485	518	480E
Horizontal Boring, Drilling & Milling Machines								
Table Type	115	77	29	28E	D	D	29	D
Floor Type	29							
Precision Boring Machines	661	564	370	400	372	431	474	406
Jig Boring Machines	894	353	56(a)	47E(a)	D(a)	D(a)	15	D
All Other Boring Machines								
Drilling Machines	27,195	17,046	13,094	12,051	9,834	8,031	7,159	9,651
Unit Value Under $2,500	24,129	15,491	12,269	11,078	8,385	6,742	5,962	7,894
Unit Value $2,500 and Over	3,066	1,555	825	973	1,449	1,289	1,197	1,757
Vertical Drilling Machines	892	546	298	342	310	291	326	713
Radial Drilling Machines	331	163	122	100	165	125	123	D
Deep Hole Drilling Machines	154	110						
Multiple Spindle Drilling Machines								
Adjustable Joint, Fixed Center	522	386	225	216	775	752	650	660
Automatic Drilling	(a)	272	180	315	199	121	96	101
All Other								
All Other Drilling Machines	1,167	78						
VALUE (Millions of Dollars)								
TOTAL	$370.9	$259.7	$136.9	$133.3	$128.9	$123.9	$153.4	$135.5
Boring Machines	231.0	193.8	95.8	96.1	85.1	83.9	106.9	86.5E
Horizontal Boring, Drilling and Milling Machines								
Table Type	53.0	51.4	20.5	35.3E	D	D	18.8	D
Floor Type	15.5							
Precision Boring Machines	122.1	109.7	60.5	49.7	48.9	62.1	84.3	70.6
Jig Boring Machines	40.4	32.7	14.8(a)	9.5E(a)	D(a)	D(a)	3.8	D
All Other Boring Machines								
Drilling Machines	139.9	65.9	41.1	37.2	43.8	40.0	46.5	49.0E
Unit Value Under $2,500	20.2	12.0	11.3	9.7	8.8	9.9	9.8	8.6
Unit Value $2,500 and Over	119.8	53.9	29.8	27.5	35.0	30.1	36.7	40.4E
Vertical Drilling Machines	22.1	6.7	6.9	5.0	4.0	3.3	3.0	3.9
Radial Drilling Machines	14.0	5.3	7.4	7.1	10.3	8.7	9.7	D
Deep Hole Drilling Machines	15.7	10.4						
Multiple Spindle Drilling Machines								
Adjustable Joint, Fixed Center	20.1	10.7	6.6	7.4	13.6	12.0	3.7	14.4
Automatic Drilling	(b)	15.6	8.8	8.0	7.2	6.1	5.4	6.7
All Other								
All Other Drilling Machines	47.8	5.2						

E - Estimated by NMTBA. D - Data withheld to avoid disclosure.

(a) There were no machines valued less than $2,500.
(b) Included with "All Other Drilling Machines."

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF GEAR CUTTING MACHINES
Units and Value, 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
TOTAL	837	445	158	199	243	253	204	164
Gear Tooth Finishing Machines(a)	254	160	90	103	164	253	204	164
Gear Hobbers-Horizontal and Vertical(b)	583	285	68	96	79			
VALUE (Millions of Dollars)								
TOTAL	$133.1	$86.5	$35.8	$42.4	$51.8	$57.3	$52.6	$48.9
Gear Tooth Finishing Machines (a)	55.3	39.9	24.8	24.3	34.6	57.3	52.6	48.9
Gear Hobbers-Horizontal and Vertical (b)	77.9	46.7	10.9	18.0	17.2			

p - Preliminary. r - Revised.

(a) Includes bevel gear generators.
(b) Includes gear shapers.

Note: Gear tooth finishing machine totals for 1981 and 1984–85 includes shipments for "all other" gear cutting machines.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF LATHES
Units, 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
TOTAL	16,904	4,508	3,695	4,300	3,836	3,057	3,117	3,126
NUMERICALLY CONTROLLED								
UNIT VALUE OVER $2,500								
Turning Machines-Horizontal Spindle								
Small	977	775	793	1,005	1,076	891	1,352	1,520
Medium	541	308	194	252	164	112	96	148
Large	266	212	116	75	104	68	82	
Turning Machines-Vertical Spindle	237	194	99	165	76	92	96	94
Turret & Boring Machines over 30"								
All Other								
NON-NUMERICALLY CONTROLLED								
UNIT VALUE UNDER $2,500	D	247	250	45E	15E	20E	D	D
UNIT VALUE $2,500 and Over	D	2,772	2,243	2,758E	2,401E	1,874E	1,491	1,364
Mfg, Tool Room and Engine & Tool Room (Light and Heavy)								
Floor Mounted								
0" to 16" Swing Over Cross Slide	2,657	1,374	1,184	344(a)	278(a)	716	668	539
17" and Over	240	157	63	72	D	152		
All Other Engine & Tool Room Lathes								
Automatic Lathes-Single Spindle	357	142	D	D	D	D	D	D
Automatic Lathes-Multiple Spindle								
Bar (Screw) Machines	809	293	233	334	231	169	D	D
Chucking Machines	131	54	D	D	D	D	D	D
All Other Horizontal Turning Machines	182	62	438	D	D	300	311	261
Vertical Turret Lathes and Boring Machines	D	D	D	D	D	0	D	D
All Other Vertical Turning Machines	D	D	D	D	D	D	D	D
All Other Non-Numerically Controlled	D	D	D	D	D	D	D	D

p - Preliminary. r - Revised. E - Estimated by NMTBA. D - Withheld to avoid disclosure.

(a) Includes "Over 8 inches to 16 inches" only.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF LATHES
Value, 1981 to Date
(Millions of Dollars)

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
VALUE								
TOTAL	$816.8	$507.3	$320.9	$307.6	$318.7	$262.0	$287.3	$268.8
NUMERICALLY CONTROLLED								
AVERAGE OVER $2,500								
Turning Machines-Horizontal Spindle								
Small	$134.2	$ 87.9	$ 84.1	$108.1	$131.9	$105.9	$120.0	$139.3
Medium	128.7	74.8	41.1	47.2	31.4	20.5	24.1	42.2
Large	83.7	75.8	48.0	22.5	26.4	17.1	38.9	
Turning Machines-Vertical Spindle	94.8	94.8	51.3	29.9	35.5	44.5	42.6	44.6
Turret & Boring Machines over 30"								
All Other								
NON-NUMERICALLY CONTROLLED								
UNIT VALUE UNDER $2,500	D	0.5	0.7	1.0E	(b)	(b)	D	D
UNIT VALUE $2,500 and Over	D	173.4	95.7	98.9E	93.4	73.6	61.7	42.8
Mfg, Tool Room Lathes and Engine & Tool Room (Light and Heavy)								
Floor Mounted								
0" to 16" Swing Over Cross Slide	27.9	20.5	15.9	5.9(a)	3.0(a)	12.5	16.6	10.4
17" and Over	27.8	20.5	9.5	10.4	D	6.9		
All Other Engine and Tool Room Lathes								
Automatic Lathes-Single Spindle	26.1	8.4	D	D	D	D	D	D
Automatic Lathes-Multiple Spindle								
Bar (Screw) Machines	99.6	40.7	24.3	29.6	28.4	18.8	D	D
Chucking Machines	30.9	14.1	D	D	D	D	D	D
All Other Horizontal Turning Machines	46.8	15.7	9.4	D	D	6.0	17.4	6.8
Vertical Turret Lathes and Boring Machines	D	D	D	D	D	D	D	D
All Other Vertical Turning Machines	D	D	D	D	D	D	D	D
All Other Non-Numerically Controlled	D	D	D	D	D	D	D	D

p - Preliminary. r - Revised. E - Estimated by NMTBA. D - Withheld to avoid disclosure.

(a) Includes "Over 8 inches to 16 inches" only.
(b) Value less than $50,000.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF GRINDING AND POLISHING MACHINES
Units, 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
TOTAL	91,548	58,362	56,864	60,189	51,807	54,534	59,292	62,438
Unit Value Under $2,500	76,687	48,651	50,512	51,614	42,647	46,627	52,378	54,719
Unit Value $2,500 and Over	14,861	9,711	6,352	8,575	9,160	7,907	6,914	7,719
External Cylindrical Grinding Machines								
Plain	383	394	140	104	93	77	78	85
Universal	291	302	242	216	208	151	103	119
Roll and Centerless All Other External (a)	880	637	378	366	538	513	543	457
Surface Grinding Machines								
Rotary Table Type	264	152	120	137	117	84	70	65
Reciprocating Table Type								
Vertical and Horizontal	1,850	1,270	862	1,042	1,031	619	421	700
Hand Surface Type	1,822	1,310	1,251	1,708	1,646	1,303	878	892
Bench, Floor and Snag Grinders	484	469	316	460	407	322	320	265
Tool and Cutter Grinding Machines	2,818	1,568	851	955	1,333	1,439	782	981
Polishing and Buffing Machines								
Stand, drum & disc types	309	(b)	(b)	332	314	310	333	(b)
All Other Polishing	1,501	650	501	812	885	947	1,060	1,212
Honing and Lapping Machines								
Honing Machines (Except Gear) Internal and External	1,486	1,002	(b)	(b)	(b)	1,004	1,129	(b)
Flat Surface Lapping Machines	224	165	270	268	256	170	187	230
All Other Honing and Lapping Machines	354	(b)	(b)	(b)	(b)	(b)	(b)	(b)
All Other (c)	2,195	1,792	1,421	2,175	2,332	968	1,010	2,713

p - Preliminary. r - Revised.

(a) Includes chucking grinders.
(b) Included in "All Other."
(c) This item includes items not disclosed, see footnote (b).

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF GRINDING AND POLISHING MACHINES
Value, 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
VALUE (Millions of Dollars)								
TOTAL	$615.4	$486.7	$280.8	$335.6	$415.0	$419.7	$379.5	$356.2
Unit Value Under $2,500	17.9	13.2	12.1	13.7	10.8	11.4	12.8	14.7
Unit Value $ 2,500 and Over	597.5	473.5	268.7	321.9	404.2	408.3	366.7	341.5
External Cylindrical Grinding Machines								
Plain	63.9	68.9	30.2	22.9	21.4	21.7	20.1	21.2
Universal	18.6	23.7	18.2	14.5	15.5	12.1	6.6	8.8
Roll and Centerless All Other External (a)	160.8	93.6	44.3	47.2	72.8	85.0	75.9	53.1
Surface Grinding Machines								
Rotary Table Type	36.5	21.4	19.2	21.9	17.0	16.4	16.4	13.0
Reciprocating Table Type								
Vertical and Horizontal	37.7	35.4	14.1	24.1	20.5	16.5	13.3	20.6
Hand Surface Type	13.8	11.2	8.3	13.9	11.5	9.2	8.9	6.8
Bench, Floor and Snag Grinders	7.3	3.5	2.2	7.6	5.0	8.4	12.1	7.5
Tool and Cutter Grinding Machines	36.4	31.1	28.4	35.0	55.2	58.6	43.5	57.7
Polishing and Buffing Machines								
Stand, drum & disc types	8.6	(b)	(b)	4.6	6.2	4.9	6.0	(b)
All Other Polishing	33.2	24.4	14.4	22.4	25.1	31.3	20.9	25.0
Honing and Lapping Machines								
Honing Machines (Except Gear) Internal and External	28.3	23.0	(b)	(b)	(b)	32.7	39.6	(b)
Flat Surface Lapping Machines	4.0	4.3	5.9	8.9	10.4	6.2	8.6	12.4
All Other Honing and Lapping Machines	13.9	(b)	(b)	(b)	(b)	(b)	(b)	(b)
All Other (c)	134.5	133.0	83.5	98.9	143.6	105.3	94.8	115.4

p - Preliminary. r - Revised.

(a) Includes chucking grinders.
(b) Included in "All Other."
(c) This item includes items not disclosed, see footnote (b).

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF BROACHING MACHINES, SHAPERS, SAWING AND CUTOFF MACHINES AND OTHER METAL CUTTING MACHINES

Units, 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
TOTAL	77,220	39,946	18,246	19,308	18,272	14,757	13,758	16,826
Unit Value Under $2,500	64,347	29,990	9,609	10,816	11,009	7,882	7,231	9,683
Unit Value $2,500 and Over	12,873	9,956	8,637	8,492	7,263	6,875	6,527	7,143
Broaching Machines	204	166	120	143	144	126	81	58
Sawing and Cutoff Machines								
Power Hack Saws	509	562	1,032	617	124	137	104	82
Circular Cutoff Saws	145	100	102	140	168	(a)	(a)	(a)
Abrasive Wheel Saws	497	322	219	166				
Band Saw	5,316	4,066	2,971	3,565	3,488	2,719	2,904	3,862
All Other	840	1,228	1,180	817	747	615	558	613
Tapping Machines	412	373	460	704	206	(a)	(a)	(a)
Station Type Machines								
Dial or Rotary	491	270	270	318	239	298	283	182
Way Type	64	54	46	(a)				
Transfer	439	346	138	173	192	213	94	63
Other, N.E.C.	185	122	121	(a)	100	130	53	32
Electrical Discharge Machines (EDM) Electrochemical Machines (ECM)	1,725	1,113	1,055	1,082	1,027	938	1,026	626
All Other Metal Cutting Machines (b)	2,046	1,214	923	767	828	1,699	1,424	1,625

p - Preliminary. *r* - Revised.

(a) Included with "All Other."

(b) Includes items not disclosed due to confidentiality considerations, see footnote (a).

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF BROACHING MACHINES, SHAPERS, SAWING AND CUTOFF MACHINES AND OTHER METAL CUTTING MACHINES

Value, 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
VALUE (Millions of Dollars)								
TOTAL	$1,191.5	$977.3	$460.5	$476.3	$567.6	$731.7	$500.3	$381.4
Unit Value Under $2,500	25.7	14.8	7.2	9.6	10.3	8.8	7.3	9.9
Unit Value $ 2,500 and Over	1,165.8	962.5	453.3	466.7	557.4	722.9	493.0	371.5
Broaching Machines	36.0	38.3	15.1	19.6	18.9	22.8	10.6	7.5
Sawing and Cutoff Machines								
Power Hack Saws	3.2	3.4	5.2	3.2	0.9	1.2	1.3	1.0
Circular Cutoff Saws	22.2	5.1	2.3	2.9	6.1	(a)	(a)	(a)
Abrasive Wheel Saws	5.5	3.5	2.4	2.3				
Band Saws	56.8	49.6	29.1	36.7	35.3	27.6	26.1	35.3
All Other	24.0	37.1	24.7	16.3	19.2	15.9	15.3	20.9
Tapping Machines	7.2	7.7	7.0	13.1	15.3	(a)	(a)	(a)
Station Type Machines								
Dial or Rotary	70.1	48.0	25.6	35.7	45.3	132.1	123.3	85.0
Way Type	38.7	57.8	25.6	(a)				
Transfer	684.5	540.4	153.4	221.8	290.1	322.8	144.6	128.4
Other, N.E.C.	102.8	84.9	69.5	(a)	70.7	62.8	29.6	11.7
Electrical Discharge Machines (EDM) Electrochemical Machines(ECM)	66.9	35.8	48.5	30.1	32.1	33.2	57.4	26.3
All Other Metal Cutting Machines (b)	47.8	51.0	44.9	85.0	23.4	104.5	84.8	55.4

p - Preliminary. r - Revised.

(a) Included with "All Other."

(b) Includes items not disclosed due to confidentiality considerations, see footnote (a).

Individual items may not add to totals due to rounding.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF MACHINING CENTERS
Units and Value, 1981 to date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS TOTAL	2,081	1,396	1,005	1,237	1,077	918	1,036	1,277
Unit Value over $2,500								
Drill, Mill, Bore-Manual Tool Change (Vertical and Horizontal)	263	249	133	(a)	(a)	(a)	(a)	(a)
Drill, Mill, Bore-Vertical (Automatic Tool Change)								
Y-axis Travel Less Than 20 Inches	(a)	(a)	(a)	452	341	296	229	276
Y-axis Travel 20 Inches to 26 Inches	539	309	210	241	224	181	329	368
Y-axis Travel Over 26 Inches	280	193	91	122	96	67	95	122
Drill, Mill, Bore-Horizontal (Automatic Tool Change)								
Y-axis Travel Less Than 27 Inches	429	237	114	171	143	(a)	(a)	236E
Y-axis Travel 27 Inches to 40 Inches	233	166	64	71E	139	59	(a)	(a)
Y-axis Travel Over 40 Inches	127	107	36	19E		94	84	73
All Other Machining Centers (b)	210	135	357	161E	134	221	299	202
VALUE (Millions of Dollars) TOTAL	$482.7	$357.6	$182.9	$213.2	$214.7	$206.4	$193.8	$273.7
Unit Value over $2,500								
Drill, Mill, Bore-Manual Tool Change (Vertical and Horizontal)	32.4	33.2	18.5	(a)	(a)	(a)	(a)	(a)
Drill, Mill, Bore-Vertical (Automatic Tool Change)								
Y-axis Travel Less than 20 Inches	(a)	(a)	38.4	38.4	30.8	26.0	18.1	24.0
Y-axis Travel 20 Inches to 26 Inches	84.7	48.1	28.3	32.5	32.0	25.1	37.2	48.3
Y-axis Travel Over 26 Inches	59.4	39.8	17.6	24.0	22.1	15.2	18.5	27.9
Drill, Mill, Bore-Horizontal (Automatic Tool Change)								
Y-axis Travel Less Than 27 Inches	106.7	72.3	29.9	46.8	37.2	(a)	(a)	60.8E
Y-axis Travel 27 Inches to 40 Inches	88.3	66.4	26.3	34.5E	70.4	22.5	(a)	(a)
Y-axis Travel Over 40 Inches	80.8	79.7	27.2	16.3E		66.3	57.9	53.1
All Other Machining Centers (b)	30.4	18.1	35.1	20.7E	22.2E	51.3E	62.1	59.6

p - Preliminary. r - Revised. E - Estimated by NMTBA.

(a) Included in "All Other Machining Centers."

(b) This item includes "All Other Machining Centers" and those items not disclosed due to confidentiality considerations, see footnote (a).

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF MILLING MACHINES
Units and Value, 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
TOTAL	17,193	7,737	7,247	7,981	8,308	7,973	6,270	7,325
Unit Value Under $2,500	1,349	921	1,036	450E	320E	745E	785E	550E
Unit Value $2,500 and Over	15,844	6,816	6,211	7,531E	7,988E	7,228E	5,494E	6,775E
General Purpose, Knee or Bed:								
Horizontal, Plain, Universal, and Ram	14,071	5,850	5,445	D	D	D	D	D
Vertical, except Ram								
Vertical Ram								
Automatic and manufacturing:								
Single spindle	356	228	177	197	143	175	D	D
Multiple spindle and special purpose machines	848	429	347	D	D	D	437	D
Profile machines and duplicators	286	309	242	179	186	203	177	157
Die Sinking and engraving machines	283							
All Other Milling Machines								
VALUE (Millions of Dollars)								
TOTAL	$436.6	$265.6	$146.5	$179.9	$180.6	$161.2	$213.6	$178.5
Unit Value Under $2,500	1.0	0.6	0.8	1.0E	0.5E	1.0E	1.0E	0.7E
Unit Value $2,500 and Over	435.6	265.0	145.7	178.9E	180.1E	160.2E	212.6E	177.8E
General Purpose, Knee or Bed:								
Horizontal, Plain, Universal, and Ram	140.1	64.4	71.4	D	D	D	D	D
Vertical, except Ram								
Vertical Ram								
Automatic and manufacturing:								
Single spindle	37.3	21.9	7.6	10.9	6.2	7.5	D	D
Multiple spindle and special purpose machines	53.9	21.9	22.9	D	D	D	19.6	D
Profile machines and duplicators	157.3	155.7	47.3	60.0	83.8	77.7	138.9	86.5
Die Sinking and engraving machines	47.0							
All Other Milling Machine								

p - Preliminary. r - Revised. E - Estimated by NMTBA. D - Withheld to avoid disclosure.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF METAL FORMING MACHINE TOOLS

Units and Value, 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
TOTAL	66,666	48,204	50,073	56,698	53,345	49,398	47,645	53,461
Punching, Shearing, Bending and Forming	40,602	29,738	31,251	35,104	33,164	28,941	25,102	25,963
Punching and Shearing (a)	5,423	3,736	2,784	3,164	3,548	3,427	3,651	4,591
Bending and Forming (a)	7,472	5,990	5,958	6,295	7,042	6,584	6,156	6,502
Presses	18,030	11,765	9,665	10,814	9,137	9,439	8,117	8,486
Presses (a)	4,123	3,147	2,419	2,722	2,611	2,685	2,532	3,041
Other Metal Forming Machine Tools	8,034	6,701	9,157	10,780	11,044	11,018	14,426	19,012
VALUE (Millions of Dollars)								
TOTAL	$1,064.3	$863.6	$580.6	$738.1	$804.9	$785.6	$802.1	$940.5
Punching, Shearing, Bending and Forming	418.9	308.8	258.7	317.1	322.5	294.4	331.4	388.3
Punching and Shearing(a)	198.1	136.5	114.2	132.4	137.4	117.6	158.0	182.7
Bending and Forming(a)	200.5	156.5	127.0	165.4	166.7	162.0	134.1	191.7
Presses	429.6	344.8	160.8	230.1	254.0	293.1	264.3	301.9
Presses (a)	418.6	338.3	156.1	224.9	250.0	288.1	260.3	298.1
Other Metal Forming Machine Tools	215.8	210.0	161.1	190.9	228.4	198.1	206.4	250.3

p - Preliminary. r - Revised.

(a) Machine tools under $2,500 are not included so the individual items do not add to the totals.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF HYDRAULIC AND PNEUMATIC METALWORKING PRESSES
Units and Value (a), 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
Hydraulic and Pneumatic Presses								
Vertical Single Action								
Housing or Straight Side Type	39	82	55	65	44	55	14	30
Column and Open Rod Type	347	268	141	219	236	95	103	D
Gap or C-Frame								
15 Tons and Under	483	450	366	137	83	438	472	576
16-35 Tons	55	99		29E	55	48	D	D
Over 35 Tons	98			56	62	63	D	59
Vertical Multiple Action, All Tonnages, Extrusion and Horizontal Presses	— 702	569	D	D	615	D	D	D
All Other Hydraulic Presses						699	557	819
Value (Millions of Dollars)								
Hydraulic and Pneumatic Presses								
Vertical Single Action								
Housing or Straight Side Type	$16.3	$30.0	$12.1	$14.2	$9.6	$11.1	$4.3	$7.4
Column and Open Rod Type	8.5	7.3	7.4	13.2	9.3	5.8	7.6	D
Gap or C-Frame								
15 Ton and Under	4.6	9.3	4.3	2.1	2.2	3.4	3.7	5.7
16-35 Tons	1.6	4.8		0.9E	1.6	2.0	D	D
Over 35 Tons	4.9			5.9	4.1	4.4	D	6.9
Vertical Multiple Action, All Tonnages, Extrusion and Horizontal Presses	50.0	53.8	D	D	31.4	D	D	D
All Other Hydraulic Presses						17.2	23.1	21.5

p - Preliminary. r - Revised. E - Estimated by NMTBA. D - Withheld to avoid disclosure.

(a) Unit value $2,500 or over.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery."

SHIPMENTS OF MECHANICAL PRESSES
Units and Value (a), 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
Open Back Inclinable, Gap Type								
50 Tons and Under	642	433	435	496	570	430	423	420
51 Tons to 120 Tons	444	255	205	269	243	205	151	194
120 Tons and Over	87	D	D	D		61	50	D
Vertical Straight-sided and Arch Frame Single Action								
Single Point	90	D	D	D	176	D	D	D
Two Point								
300 Tons and Under	154	137	D	152		72	56	D
301 Tons and Over	46					57	59	36
Gap and Horn Type	242	162	52	D	67	37	36	21E
Automatic Presses	389	327	310	471	340	241	331	414
All Other Mechanical Presses	305	296	105	129	120	138	105	170
VALUE (Millions of Dollars)								
Open Back Inclinable, Gap Type								
50 Tons and Under	$ 13.4	$ 9.6	$ 7.9	$ 9.2	$ 9.7	$ 8.2	$ 4.7	$ 6.4
51 Tons to 120 Tons	19.1	11.0	8.0	14.0	14.1	13.2	7.3	11.6
120 Tons and Over	8.0	D	D	D		3.0	2.8	D
Vertical Straight-sided and Arch Frame Single Action								
Single Point	20.7	D	D	D	50.9	D	D	D
Two Point								
300 Tons and Under	25.5	43.1	D	27.4		12.4	12.6	D
301 Tons and Over	39.4					65.1	33.7	15.3
Gap and Horn Type	5.6	4.5	2.1	D	4.7	3.7	4.0	1.8E
Automatic Presses	72.2	47.6	34.9	65.2	59.5	47.0	52.0	57.1
All Other Mechanical Presses	129.0	103.3	21.3	24.7	52.9	79.5	85.4	120.4

p - Preliminary. r - Revised. D - Withheld to avoid disclosure. E - Estimated by NMTBA.

(a) Unit value $2,500 or over.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF PUNCHING, SHEARING, BENDING AND FORMING MACHINES

Units (a), 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
Punching and Shearing Machines								
Power operated:								
Punches, Including Combination Punching and Shearing	2,512	1,870	1,112	1,293	1,667	1,551	1,684	1,982
Punching Machines, Fixed Position & Two Axes Positioning Table	678	407	392	516	327	444	394	507
Plate Shearing Machines	1,352	942	875	906	1,144	936	1,011	1,158
Bar and Angle, and Rotary Shearing Machines	186	152	133	108	99	94	99	83
Other Punching and Shearing Machines (Power or Manual)	695	365	272	341	311	402	463	861
Bending and Forming Machines								
Bending Rolls, Sheet and Plate (Power)	409	262	259	265	301	281	291	354
Bending Rolls, Angles, Bars and Shapes (Power)	300	116	D	(b)	D	D	D	D
Press Brakes (Power):								
Mechanical	548	415	574	371	1,035	1,024	74	122
Hydraulic	904	612	599	799	641	615	657	842
Hydro-Mechanical	350	262	D	314	D	147	134	D
Rotary Bending and Forming (Power)	1,200	1,051	1,483	1,675	1,979	1,893	2,033	2,020
Ram and Press Bending	1,017	819	360	347	D	D	D	440E
Other Bending and Forming Machines (Power or Manual)	2,744	2,453	2,435	2,524	2,450	2,245	2,967	2,523

p - Preliminary. r - Revised. D - Withheld to avoid disclosure. E - Estimated by NMTBA.

(a) Unit value $2,500 or over.
(b) Included in "Rotary Bending & Forming (Power)."

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF PUNCHING, SHEARING, BENDING AND FORMING MACHINES
Value (a), 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
VALUE (Millions of Dollars)								
Punching and Shearing Machines								
Power operated:								
Punches, Including Combination Punching and Shearing	$26.0	$21.4	$16.3	$15.6	$15.7	$13.8	$16.8	$21.5
Punching Machines, Fixed Position & Two Axes Positioning Table	84.8	45.7	48.5	72.2	49.4	50.0	61.7	75.9
Plate Shearing Machines	65.9	55.2	40.8	37.9	60.3	35.4	43.1	44.8
Bar and Angle, and Rotary Shearing Machines	3.0	1.8	2.0	1.0	.7	1.0	15.1	0.7
Other Punching and Shearing Machines (Power or Manual)	18.3	12.3	6.6	5.8	11.4	17.4	21.3	39.8
Bending and Forming Machines								
Bending Rolls, Sheet and Plate (Power)	25.7	13.9	5.7	6.0	8.5	6.0	4.1	18.2
Bending Rolls, Angles, Bars and Shapes (Power)	15.9	13.3	D	(b)	D	D	D	D
Press Brakes (Power):								
Mechanical	12.5	7.7	11.1	8.6	10.4	12.5	3.3	3.8
Hydraulic	40.7	28.0	20.3	37.9	29.0	29.4	30.9	43.2
Hydro-Mechanical	9.1	5.8	D	7.1	D	3.9	3.9	D
Rotary Bending and Forming (Power)	23.6	24.4	22.3	39.3	30.8	27.3	24.5	20.3
Ram and Press Bending	15.1	11.4	8.5	7.6	D	D	D	10.3
Other Bending and Forming Machines (Power or Manual)	57.9	52.1	41.7	58.9	60.2	58.7	67.4	70.6

p - Preliminary. r - Revised. D - Withheld to avoid disclosure.

(a) Unit value $2,500 or over.

(b) Included in "Rotary Bending & Forming (Power)."

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

SHIPMENTS OF FORGING AND OTHER METAL FORMING MACHINE TOOLS

Units and Value (a), 1981 to Date

Products	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
UNITS								
Forging Machines	479	383	263	198	213	142	184	225E
Riveting Machines (Except Portables)	1,764	1,320	1,592	1,759	1,972	2,018	1,095	2,191
Thread Rolling Machinery	150	111	80	160	245	491	297	400
Die Casting Machines								
Under 500 Tons	112	75	102	170	167	139	134	140
501 and Over	56	31						
Metal Container Making Machines	2,326	1,349	1,105	949	707	697	869	1,138
All other Metal Forming, N.E.C.		1,939	1,808	2,357	2,178	1,807	1,423	1,889
VALUE (Millions of Dollars)								
Forging Machines	$79.0	$79.0	$48.0	$29.0	$35.4	$15.1	$42.7	$52.5E
Riveting Machines (Except Portables)	24.3	14.6	12.7	18.5	26.1	19.1	13.8	20.7
Thread Rolling Machinery	8.5	7.2	5.0	12.3	18.6	39.8	9.7	9.7
Die Casting Machines								
Under 500 Tons	11.5	8.0	18.4	38.0	44.9	35.3	36.8	43.7
501 Tons and Over	15.1	8.7						
Metal Container Making Machines	73.1	44.0	37.2	43.1	41.0	38.4	56.6	100.3
All other Metal Forming, N.E.C.		46.1	35.2	44.3	56.6	44.8	41.1	68.4

p - Preliminary. r - Revised. E - Estimated by NMTBA. N.E.C. - Not elsewhere classified.

(a) Unit value $2,500 or over.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

INDUSTRIES MANUFACTURING MACHINE TOOLS
Value of Shipments, by Industry, by Type, 1977 and 1982
(Millions of Dollars)

			Shipped by					
	All Industries		Metal Cutting Machine Tool Industry SIC 3541	Metal Forming Machine Tool Industry SIC 3542	Special Dies, Tools Jigs, & Fixtures Industry SIC 3544	Machine Tool Accessories Industry SIC 3545	Metal Working Machinery N.E.C. Industry SIC 3549	Other Industries
	1977	1982	1982					
Metal Cutting Machine Tools								
Total	$2,561	$4,155	$3,877	$25	$ 4	$75	$31	$143
Boring Machines	94	199	194	—	D	D	D	D
Drilling Machines	109	67	53	D	—	D	D	D
Gear Cutting & Finishing	67	87	D	—	—	D	—	—
Grinding & Polishing	288	515	469	1	—	D	D	D
Lathes	456	524	515	D	D	D	D	D
Milling Machines	168	265	251	10	—	D	D	D
Other Machine Tools (a)	714	1,437	1,328	D	D	D	D	D
Parts Sold Separately (b)	502	892	824	7	2	20	6	34
Not Specified	163	169	D	—	—	—	—	D
Metal Forming Machine Tools								
Total	$1,115	$1,384	$43	$1,211	$ 9	$ D	$ D	$ D
Punching, Shearing, Bending, and Forming Machines	280	317	D	287	D	—	4	D
Presses, incl. Forging Presses(c)	283	369	10	331	D	D	D	D
Other Metal Forming Tools	172	217	D	177	D	D	D	D
Parts & Rebuilt Machines	296	380	15	317	3	D	4	D
Not Specified	85	101	—	98	—	—	D	D

D - Withheld to avoid disclosure. N.E.C. - Not elsewhere classified.

(a) Includes machine tools for home workshops, laboratories, etc.
(b) Includes rebuilt machine tools.
(c) In 1982, Forging Presses are included in "Other Metal Forming Tools."

Source: U.S. Bureau of the Census, "Census of Manufacturers 1982; MC82(2)-35C" and earlier issues.

Machine tools are "primary products" of the metal cutting and metal forming machine tool industries (SIC 3541 and 3542). However, other industries also manufacture machine tools as "secondary products." In turn, the machine tool industry produces some products other than machine tools.

MILITARY PRIME CONTRACT AWARDS FOR MACHINE TOOLS

Fiscal Years 1985 to Date

(Thousands of Dollars)

	Year ending June 30			
	1985	1986	1987	1988
Saws and filing machines	$ 1,965	$ 2,787	$ 4,003	$ 4,087
Machining centers and way type machines	19,171	13,178	23,245	16,333
Electrical and ultrasonic erosion machines	1,645	3,732	3,567	1,187
Boring machines	8,324	12,013	3,935	323
Broaching machines	68	1,228	413	117
Drilling machines and tapping machines	2,433	6,808	2,944	9,969
Gear cutting and finishing machines	435	1,236	362	1,307
Grinding machines	18,662	25,480	20,838	18,149
Lathes	17,796	27,008	25,968	17,052
Milling machines	12,630	12,089	10,094	13,575
Planers and shapers	660	374	133	2,509
Miscel. machine tools	3,616	2,280	3,659	6,109
Total metal cutting machine tools	$ 87,405	$108,213	$ 99,161	$ 90,717
Bending and forming machines	$ 7,410	$ 10,824	$ 9,436	$ 4,590
Hydraulic and pneumatic presses	1,367	3,039	5,457	4,718
Mechanical presses, power driven	940	7,600	865	3,345
Manual presses	670	235	463	392
Punching and shearing machines	5,627	6,811	2,783	7,920
Forging machinery and hammers	289	2,753	748	924
Wire and metal ribbon forming machines	0	0	406	200
Riveting machines	358	226	70	314
Miscel. secondary forming & cutting mach.	424	780	561	1,038
Total metal forming machine tools	$ 17,085	$ 32,268	$ 20,789	$ 23,441
Total Machine Tools	$104,490	$140,481	$119,950	$114,158

Source: Department of Defense, OASD (Comptroller), "Military Prime Contract Awards, by Service Category and Federal Supply Classification."

5

U. S. MACHINE TOOL FOREIGN TRADE

Foreign trade has been a fact of life for the U.S. machine tool industry since the 1870s, when U.S. builders went to Europe seeking orders during the severe U.S. economic depression of 1873-1879. Just as European orders helped the industry then, Soviet business helped many builders keep their doors open in 1930 and 1931. Shipments to the Soviet Union alone accounted for 23% of U.S. production in 1931. During 1939-1944 machine tool trade with the United Kingdom and the Soviet Union increased by a multiple of four. In the years immediately after World War II, machine tool exports to Europe and Japan exploded. Then, in the sixties and seventies, U.S. demand for machine tools became the engine for expansion of machine tool trade and the industry's international growth. Today, as the eighties draw to a close, imports account for approximately half of U.S. machine tool consumption, while exports represent about one-fifth of U.S. production. In today's globalized economy, machine tool foreign trade has become an integral part of the U.S. machine tool industry.

Twenty-five years ago, U.S. exports represented more than 6% of world machine tool consumption; today U.S. exports supply slightly more than 2% of world demand. The decline in the U.S. share was the result of rapid market expansion and not a decline in nominal exports. Throughout the sixties U.S. machine tool exports were between $200 and $300 million per year. Then, in 1973, exports began to expand rapidly, climbing to a record $1,028 million in 1981. In the subsequent two years, a depressed world market and a strong dollar drove exports down 61% to $406 million in 1983. Exports have risen strongly in the past two years as the dollar has fallen to competitive levels.

Twenty-five years ago imports represented only 4% of U.S. machine tool consumption but since that time growth has been phenomenal. In 1971 imports were $90 million, a cyclical low. By 1981 imports had reached a cyclical peak of $1,431 million yielding an average annual growth rate of 32% since 1971. Between 1981 and 1983 U.S. machine tool consumption fell 55%, but as a result of the dollar's appreciation, imports declined only 36%. When machine tool demand rose in 1984, imports climbed 50% while exports grew by less than 1%, and the negative trade balance ballooned. But in the past two years, the deficit (although still huge) has narrowed. The annual machine tool trade deficits for 1987 and 1988 were $1.2 billion and $1.1 billion, respectively. These deficits underscore the intensity of the international competitive pressures being felt by U.S. machine tool builders and bring into focus the reality of the world machine tool marketplace. Reestablishing its position in this world market is vital to the future of the U.S. machine tool industry.

United States Foreign Trade Statistics

The most widely used data on foreign trade are the Census Bureau reports on exports and imports. Exports and imports are compiled from copies of the shipper's own declaration filed with U.S. Customs officials. Export values are those declared by the shipper at the time of exportation. Freight, insurance, and other charges are included, thus giving exports a value higher than that of the machine tool at the manufacturer's plant.

The Census data include shipments by manufacturers and by others such as dealers and distributors. They also include exports of rebuilt machine tools, replacement parts, and machine tools designed for use in home workshops, laboratories, garages, service shops, or for modelmaking.

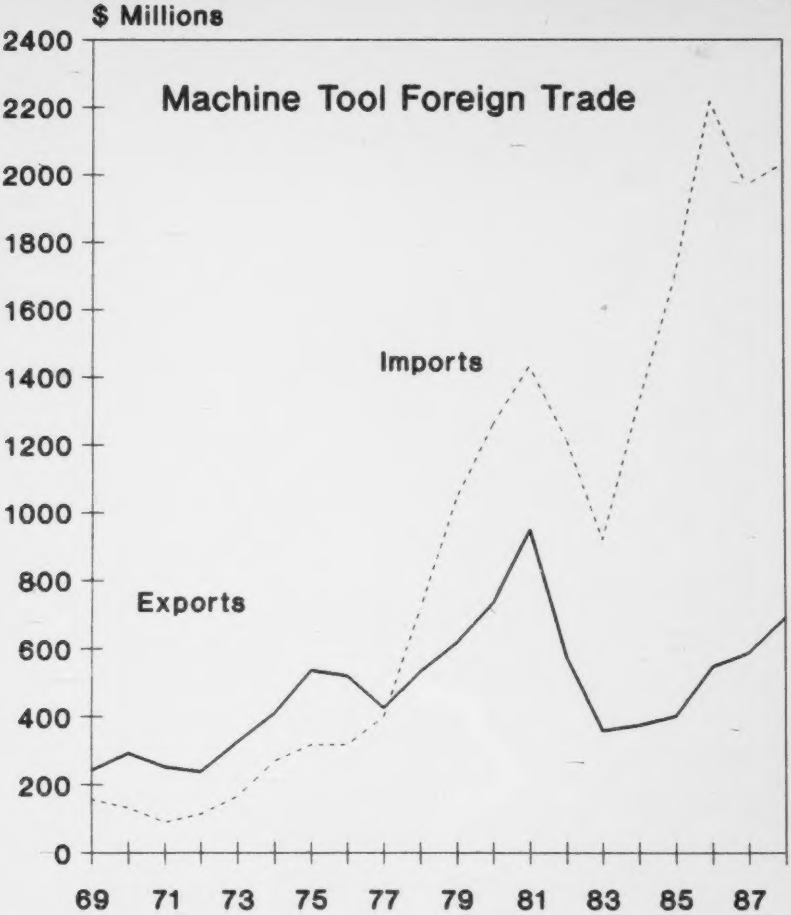
While the Census export figures tend to show a value higher than the value of the machines at the manufacturer's plant, import figures show values considerably lower than those paid by the purchaser of foreign machine tools. Values are, in general, based on the market value, or price, in the foreign country at the time of exportation and include the cost of containers, coverings, and other expenses incidental to shipping the merchandise to the United States. However, they exclude import duties, insurance, ocean freight, and other charges incidental to the arrival of the goods in the United States.

As a result of these and other factors inflating the "value" of the exports and deflating the "value" of the imports, the impact of imports is greater than that shown in most tables in this chapter. The negative balance of trade, correspondingly, is larger than shown.

There are two additional export series with a more limited scope but considered more accurate by the industry. The first is a series on foreign orders and shipments that is part of the NMTBA "Industry Estimates of New Orders, Cancellations, Shipments, and Backlog," published monthly for the entire industry. The second is the series on exports, based on manufacturers' shipments for export, published in the MQ-35W series by the Department of Commerce. This report shows manufacturers' shipments of new and complete machine tools for 12 major machine tool categories. It also shows the historical quantity and value of exports for about 15 selected types of machine tools through 1972, but only the value of exports from 1973 forward. For details on these two reports, see Chapter 4.

The two major reasons the Census data are the most widely used in spite of their shortcomings are that (1) the Census series on imports is the only one available, and (2) the two Census series on exports and imports include a similar broad "universe" (new, used, and rebuilt machines and home-workshop type machine tools).

Beginning with 1980 data, the commodity descriptions and classification numbers for machine tools were revised. Although the machine tool categories differ slightly, the resulting TSUSA import and Schedule B export classification codes are comparable and permit direct comparisons of foreign trade by product types. Foreign trade data are also comparable to U.S. production data, permitting the calculation of U.S. consumption of machine tools for a variety of product types.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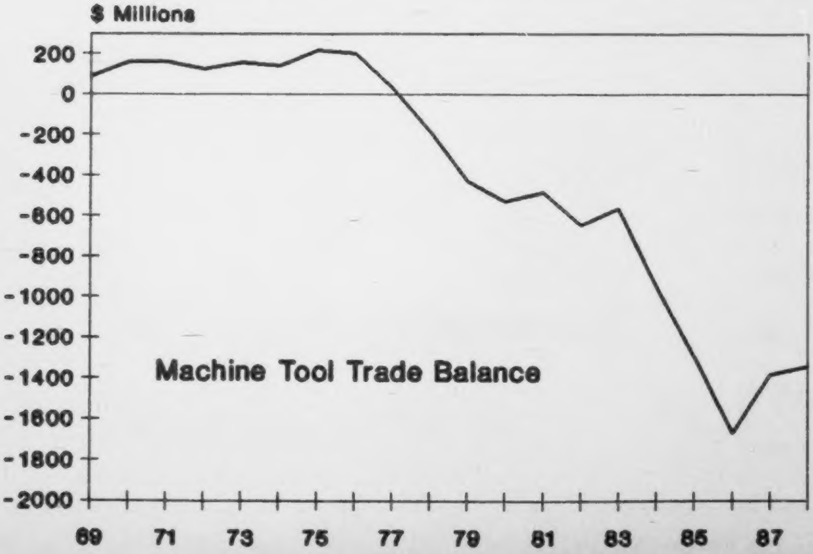
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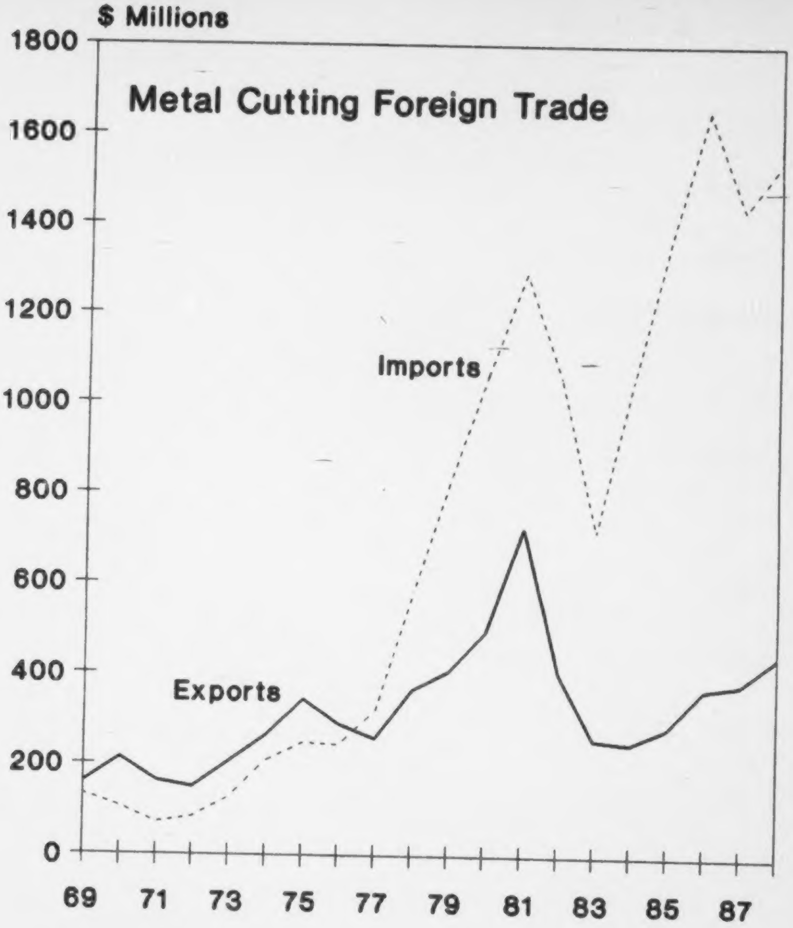
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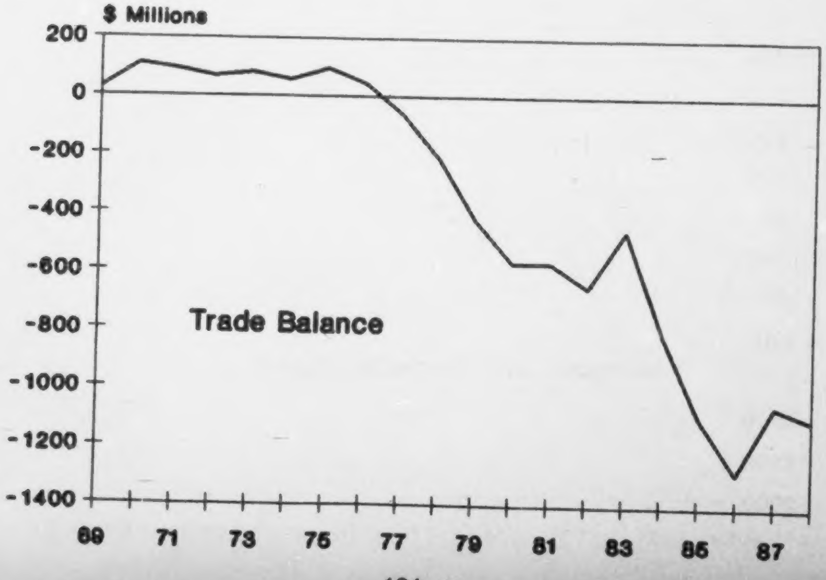
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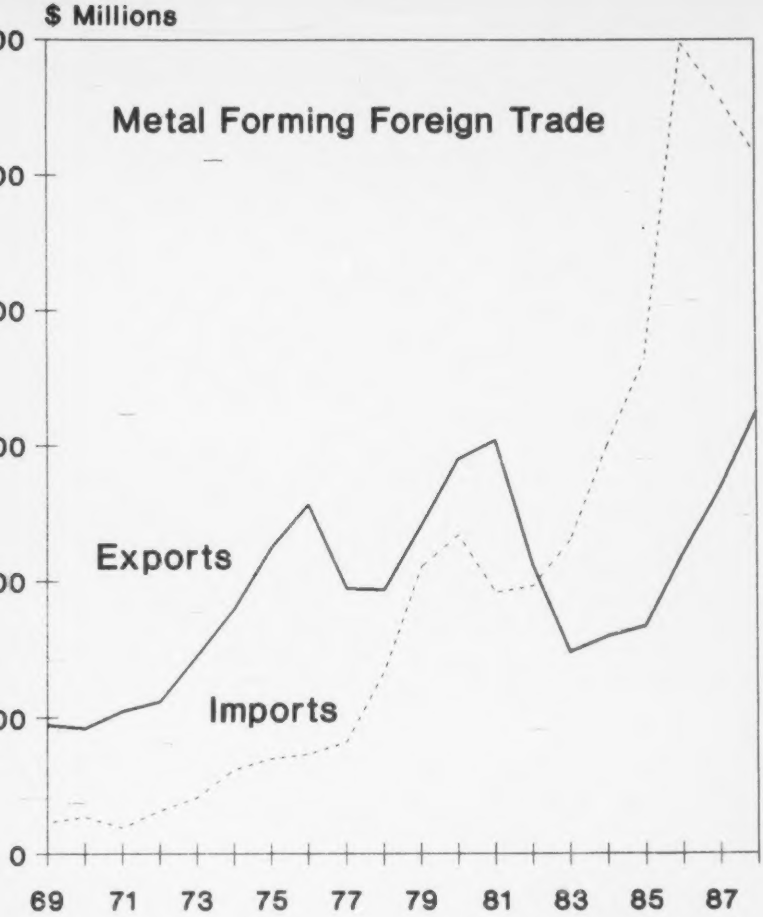
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Metal Forming Foreign Trade
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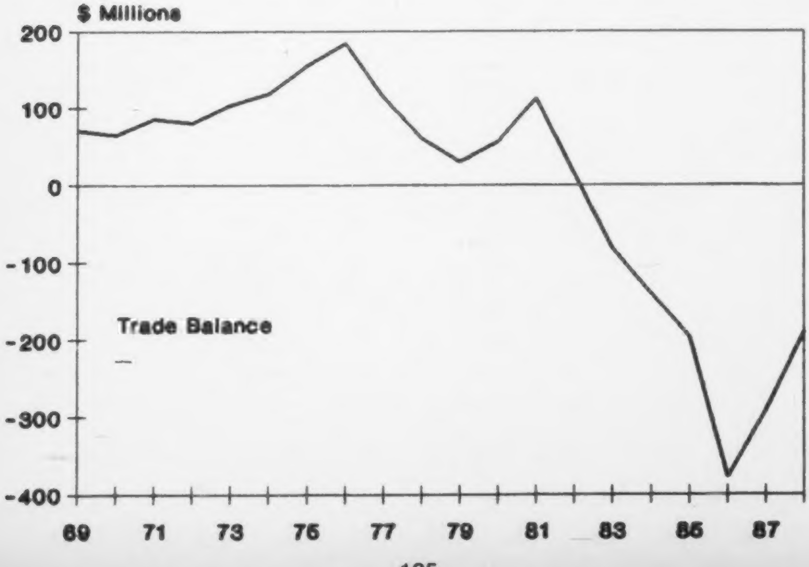
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U.S. MACHINE TOOL IMPORTS AS A PERCENTAGE OF U.S. MACHINE TOOL CONSUMPTION

By Type of Complete Machines Valued Over $2,500, 1980 to Date

Machine Classification	1980	1981	1982	1983	1984	1985	1986	1987(r)	1988(p)
Machine Tools	23.3	24.9	26.4	33.7	37.9	41.4	49.4	48.7	50.1
Metal Cutting	23.6	26.1	27.4	33.6	39.3	43.3	48.7	48.0	53.3
Boring Machines	25.0	29.3	25.2	29.4	31.9	39.4	61.5	44.4	39.1
Drilling Machines	15.7	21.7	33.3	31.6	50.9	53.6	72.7	52.6	53.5
Gear Cutting Machines	29.8	31.1	28.1	36.7	41.9	39.5	60.1	81.8	74.4
Grinding Machines	NA	22.6	22.6	28.9	30.1	29.9	35.3	40.3	47.5
Lathes	36.0	41.3	45.9	38.6	51.5	57.7	69.9	60.2	66.5
Milling Machines	30.2	23.9	26.5	28.5	34.8	45.4	45.7	31.7	40.8
Machining Centers	20.8	31.3	36.9	49.3	56.0	63.0	66.1	64.4	57.3
Metal Forming	22.1	19.4	22.5	33.8	33.7	35.8	51.2	50.4	42.8
Punching & Shearing Machines	23.3	25.7	34.6	27.5	44.9	40.0	48.0	33.1	28.5
Bending & Forming Machines	17.5	16.3	20.7	24.5	27.0	35.2	49.4	40.1	46.5
Presses	16.0	11.6	12.4	29.3	27.2	28.5	50.9	59.9	46.8
Forging Machines	28.5	21.5	25.3	49.8	55.3	33.3	134.0	52.8	48.8
Total NC Machines	23.4	32.7	35.1	38.4	50.3	55.1	60.8	53.9	54.0

p - Preliminary. r - Revised.

Sources: U.S. Dept. of Commerce: "Current Industrial Reports, Series MQ-35W, Metalworking Machinery", and U.S. Bureau of the Census, "IM 146" and "EM 522."

UNITED STATES PRODUCTION, IMPORTS, EXPORTS, AND DOMESTIC CONSUMPTION OF NEW COMPLETE MACHINE TOOLS (a), 1969 to Date

(Thousands of Dollars)

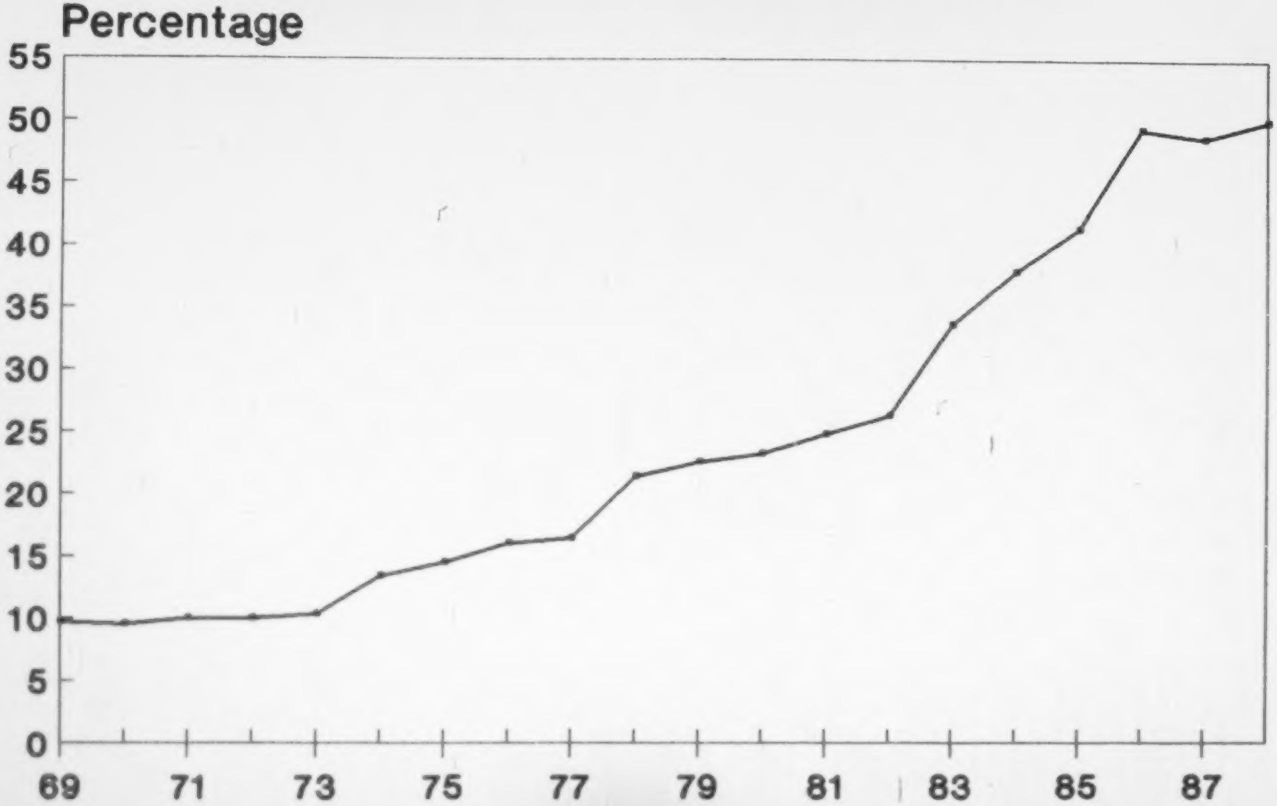
Year	Production	Exports	Imports	Domestic Consumption
1969	$1,692,186	$242,427	$ 156,122	$1,605,883
1970	1,551,777	292,086	131,826	1,391,517
1971	1,057,870	251,532	90,085	896,423
1972	1,269,302	238,135	113,998	1,145,165
1973	1,787,850	325,494	167,057	1,629,413
1974	2,165,937	410,510	270,740	2,026,167
1975	2,406,082	536,659	317,578	2,187,001
1976	2,178,265	514,942	318,304	1,981,627
1977	2,453,423	426,729	400,904	2,427,598
1978	3,142,594	533,094	715,282	3,324,782
1979	4,064,045	619,111	1,043,768	4,488,702
1980	4,812,349	734,135	1,259,802	5,338,016
1981	5,111,253	949,553	1,431,457	5,593,157
1982	3,804,250	574,567	1,217,718	4,447,401
1983	2,144,849	359,037	921,083	2,706,895
1984	2,426,382	373,457	1,318,964	3,371,889
1985	2,682,201	400,453	1,688,693	3,970,441
1986(r)	2,709,800	546,610	2,217,050	4,380,240
1987(r)	2,582,699	586,748	1,968,855	3,964,806
1988(p)	2,583,397	601,025	2,032,052	3,924,424

p - Preliminary. r - Revised.

(a) These figures reflect data for machine tools of all values but do not include the value of used and rebuilt machines.

Source: NMTBA, "Current Industrial Reports; Metalworking Series, MQ-35W," U.S. Department of Commerce Trade Statistics.

Imports as a Percentage of U. S. Machine Tool Consumption



U.S. IMPORTS OF MACHINE TOOLS (a)

Major Countries of Origin, 1979 to Date

(Millions of Dollars)

Country of Origin	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
TOTAL	$1,043.8	$1,298.5	$1,482.9	$1,253.3	$946.5	$1,356.6	$1,738.5	$2,251.8	$1,995.4	$2,058.7
Austria	3.7	2.3	2.1	15.8	30.0	4.2	7.5	7.5	16.4	9.3
Belgium	12.6	16.7	18.5	9.1	7.1	6.7	10.3	12.7	9.4	18.8
Czechoslovakia	4.6	5.7	4.7	2.0	.6	1.7	.5	.5	.7	1.7
Denmark	3.3	3.7	2.9	2.2	2.8	5.2	4.7	4.1	2.6	3.8
France	21.4	24.9	26.5	12.9	10.5	13.9	19.2	36.9	17.6	17.0
Germany (East)	1.9	2.0	2.9	3.1	2.1	1.5	1.4	1.8	1.1	1.4
Germany (West)	197.0	235.9	192.3	204.6	125.7	205.7	248.9	367.9	332.0	277.5
Italy	37.5	44.1	42.9	45.0	49.3	51.3	76.6	129.8	72.4	78.6
Netherlands	5.5	6.1	4.9	2.6	5.7	9.0	11.2	19.7	9.1	11.1
Poland	19.2	15.6	15.8	7.5	2.1	1.0	2.2	1.5	1.4	3.3
Spain	20.6	27.1	24.3	20.6	11.6	16.2	19.8	23.1	16.5	22.1
Sweden	31.3	29.3	28.3	23.4	15.3	19.2	29.0	22.6	23.6	25.8
Switzerland	66.0	81.5	78.4	71.8	54.7	78.4	95.2	115.3	103.6	94.9
United Kingdom	96.9	117.3	136.1	107.5	66.4	74.7	93.5	100.7	85.4	105.8
Canada	34.2	47.9	44.0	36.6	29.4	40.8	61.2	52.9	49.2	56.6
Brazil	5.9	7.2	9.9	9.3	6.8	5.0	21.5	19.2	7.3	29.6
Japan	353.3	492.0	687.5	529.2	414.9	683.3	854.1	1,173.6	1,061.2	1,112.5
Korea, Republic of	5.7	7.7	14.6	18.7	9.8	8.8	9.0	10.9	14.7	14.9
Singapore	12.2	13.1	14.1	11.6	4.4	7.1	15.9	7.3	9.3	12.1
Taiwan	85.7	93.6	102.4	90.9	83.4	99.2	134.2	119.3	127.5	135.5
Other Countries	25.3	24.8	29.8	28.9	13.9	23.7	22.5	24.5	34.3	28.4

(a) Data does not include parts, but does include "Used and Rebuilt."

Note: Individual items may not add to totals due to rounding.

Source: U.S. Department of Commerce, Bureau of the Census, "IM 146."

U.S. IMPORTS OF CUTTING AND FORMING MACHINE TOOLS (a)

Major Countries of Origin, 1979 to Date

(Millions of Dollars)

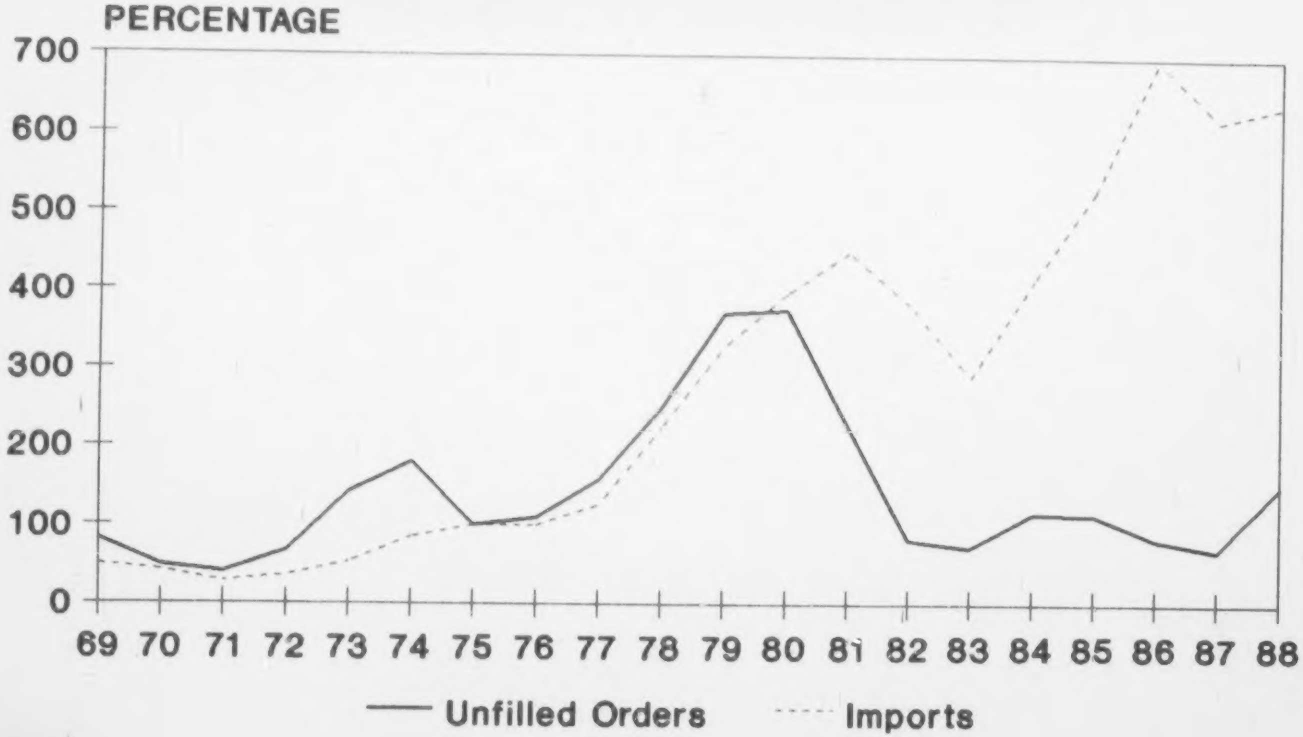
Country of Origin	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
CUTTING TOTAL	$833.1	$1,064.4	$1,291.5	$1,057.4	$716.9	$1,056.7	$1,374.7	$1,654.6	$1,435.9	$1,543.3
Austria	2.6	1.4	2.0	3.1	4.2	2.6	6.2	6.6	9.4	9.0
Belgium	6.2	8.0	10.8	5.6	3.0	.5	3.4	3.0	1.5	3.0
Czechoslovakia	4.4	5.5	4.6	2.0	.6	1.7	.5	.5	.7	1.7
Denmark	1.5	2.4	1.3	1.2	1.4	2.8	2.8	2.5	1.7	2.0
France	17.5	22.3	20.6	9.3	6.6	8.5	12.7	27.3	13.8	12.4
Germany (East)	1.8	1.9	2.9	3.1	2.0	1.5	1.3	1.1	1.0	1.1
Germany (West)	117.0	150.2	148.4	155.0	91.6	137.1	186.7	279.6	268.0	228.1
Italy	23.9	34.2	31.6	36.5	21.4	38.5	45.3	92.3	45.6	43.0
Netherlands	4.3	5.4	4.3	2.1	2.6	5.9	7.4	17.1	6.4	7.0
Poland	19.1	15.5	15.8	7.5	2.0	1.0	2.2	1.5	1.4	3.3
Spain	18.9	24.3	21.9	19.0	9.5	13.6	17.9	19.4	14.2	18.1
Sweden	21.7	19.9	19.9	14.9	7.7	11.9	15.3	11.0	16.3	10.3
Switzerland	53.9	65.9	65.4	61.1	40.5	66.1	76.3	96.6	81.1	76.4
United Kingdom	86.7	103.8	120.5	94.1	56.6	60.8	67.1	77.4	68.7	88.7
Canada	18.1	29.1	28.2	22.4	12.7	17.2	30.4	23.3	19.1	19.3
Brazil	5.9	7.1	9.8	9.0	6.5	4.3	7.7	4.2	2.3	6.3
Japan	305.9	433.4	627.4	467.8	340.0	550.6	721.4	841.8	721.3	839.2
Korea, Republic of	5.6	7.7	14.5	18.3	9.8	8.8	8.9	10.8	14.3	14.4
Singapore	12.2	13.1	14.0	11.6	4.2	6.7	15.6	6.9	7.5	10.6
Taiwan	85.3	93.1	101.6	89.9	82.4	97.3	130.4	116.1	123.0	128.8
Other Countries	20.6	20.2	26.0	23.9	11.4	19.0	15.2	15.6	18.3	20.6
FORMING TOTAL	$210.7	$234.1	$191.4	$196.0	$229.5	$299.9	$363.8	$597.2	$559.5	$515.4
Austria	1.1	.9	.1	12.8	25.7	1.5	1.3	.9	7.0	.4
Belgium	6.4	8.7	7.7	3.5	4.1	6.2	6.9	9.8	7.9	15.8
Germany (West)	80.1	85.7	44.0	49.6	34.1	68.6	62.2	88.3	63.9	49.3
France	4.0	2.5	5.9	3.6	3.9	5.4	6.5	9.6	3.8	4.6
Italy	13.6	9.9	11.3	8.6	27.9	12.8	31.3	37.5	26.8	33.5
Sweden	9.6	9.3	8.3	8.5	7.6	7.3	13.7	11.6	7.3	15.5
Switzerland	12.1	15.7	13.0	10.7	14.2	12.3	18.9	18.7	22.6	18.5
United Kingdom	10.2	13.6	15.6	13.5	9.8	13.9	26.5	23.3	16.7	17.1
Canada	16.1	18.8	15.8	14.2	16.7	23.5	30.8	29.6	30.1	37.4
Japan	47.4	58.6	60.1	61.5	74.9	132.7	132.7	331.8	339.9	273.2
Other Countries	10.1	10.4	9.6	9.5	10.6	15.6	33.0	36.1	33.4	50.1

(a) Data does not include parts, but does include "Used and Rebuilt."

Note: Individual items may not add to totals due to rounding.

Source: U.S. Department of Commerce, Bureau of the Census, "IM 146."

MACHINE TOOL INDICES OF UNFILLED ORDERS AND IMPORTS



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UNITED STATES IMPORTS OF MACHINE TOOLS AND PARTS

By Machine Classification, 1979 to Date

(Millions of Dollars)

Machine Classification	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
GRAND TOTAL	$1,269.5	$1,556.9	$1,712.9	$1,489.4	$1,100.2	$1,652.7	$2,110.2	$2,682.9	$2,412.3	$2,419.8
METAL CUTTING	1,027.6	1,282.2	1,485.1	1,258.1	836.9	1,316.5	1,685.6	2,015.3	1,803.0	$1,844.2
Complete Machines (a)	833.1	1,029.2	1,245.6	1,025.7	697.0	1,025.1	1,332.3	1,627.8	1,416.1	1,522.3
Gear Cutting or Hobbing	28.4	29.4	37.0	25.8	13.8	18.1	20.5	32.6	50.0	41.8
Drilling	25.0	27.2	26.4	20.7	9.9	17.9	32.6	39.1	29.1	33.5
Milling	83.1	138.1	124.7	87.7	52.5	83.4	133.7	113.8	87.4	103.1
Machining Centers	39.6	93.4	195.7	188.9	164.9	248.0	330.0	361.8	313.4	326.3
Boring and Vertical Turret Lathes	70.7	76.9	86.7	78.8	44.6	49.7	50.4	119.6	82.0	49.0
Lathes (Exc. Vertical Turret Lathes)	353.6	380.0	479.8	338.6	165.7	268.1	350.3	391.1	331.5	396.9
Grinding	85.2	150.5	137.2	117.6	89.6	118.5	147.9	190.0	177.6	194.7
Other	82.4	84.4	87.2	98.7	72.8	129.4	169.8	278.8	245.8	269.8
Metal Cutting, $2,500 and Under	65.1	50.0	70.9	68.9	83.2	91.8	97.1	101.0	99.1	107.2
Used and Rebuilt	(b)	35.2	45.9	31.7	19.9	31.6	42.5	26.8	19.8	21.0
Parts	194.5	217.8	193.6	200.7	120.0	259.8	310.9	360.7	367.1	300.9E
METAL FORMING	241.9	274.7	227.8	231.3	263.3	336.1	424.5	667.6	609.3	575.6
Complete Machines (a)	210.7	230.6	185.9	192.0	224.1	293.9	356.4	589.3	552.8	509.7
Metal Forming, $2,500 and Under	4.5	3.9	4.5	4.6	5.2	8.1	9.2	10.1	9.7	11.3
Used and Rebuilt	(b)	3.5	5.5	3.9	5.5	6.0	7.4	7.9	6.7	5.7
Parts	31.2	40.6	36.3	35.4	33.8	36.3	60.7	70.4	49.8	60.2E

E - Estimated.

(a) Excludes "Used and Rebuilt."

(b) Included in respective machine classifications.

Note: Individual items may not add to totals due to rounding. This table is based on a set of classifications which was expanded in 1978 and again in 1980. A separate table on the following page reports import data for 1986 and 1987 using the more detailed machine tool categories.

Source: U.S. Department of Commerce, Bureau of the Census, "IM 146."

It should be noted that machine tool imports, as reflected in government statistics, are actually undervalued. They reflect values in the country of origin and do not include ocean freight, insurance, dealer commissions or import duties. The purchaser in this country is paying significantly more for imported machine tools than is reported in the import statistics.

U.S. IMPORTS OF METAL CUTTING MACHINE TOOLS AND PARTS

By Machine Classification, 1987 and 1988

(Values in Thousands of Dollars)

Machine Classification	1987		1988	
	Units	Value	Units	Value
GRAND TOTAL	1,124,000	$1,803,014(a)	1,079,288	$1,665,240(E,a)
Complete New Machines	1,119,329	$1,416,080	1,077,326	$1,543,327
Gear Hobbers	89	14,510	78	10,773
Gear Shapers	50	6,481	15	3,744
Gear Cutting Machines, N.E.C.	35	2,488	41	2,712
Vertical Mach. Ctrs. ATC, NC, Y-Axis Travel 26" or Less	1,529	127,129	1,788	140,591
Vertical Mach. Ctrs. ATC, NC, Y-Axis Travel Over 26"	191	17,493	99	11,004
Horizontal Machining Centers, ATC, NC	723	113,747	688	112,921
Machining Center, NC, N.E.C.	471	55,058	344	61,760
Single Station and Multi-Station Transfer Machines	102	22,279	184	67,537
Way Type Machines (Unit Heads)	3	179	0	0
Horiz. Boring-Drilling-Milling Machines, Table Type, NC	9	3,699	16	1,536
Horiz. Boring-Drilling-Milling Machines, NC, N.E.C.	61	17,479	48	8,880
Vertical Boring-Drilling-Milling Machines, NC	163	13,591	135	13,062
Horiz. Boring-Drilling-Milling Machines, non-NC	36	2,701	14	1,658
Vertical Boring-Drilling-Milling Machines, non-NC	233	6,261	192	6,068
Drilling Machines, NC	159	7,621	273	11,604
Drilling Machines, Multi-Spindle, non-NC	71	2,220	98	1,238
Drilling Machines, Radial, non-NC	183	1,071	201	1,329
Drilling Machines, Upright, Single Spindle, non-NC	71	680	165	1,674
Drilling Machines, non-NC, N.E.C.	727	17,549	586	17,666
Milling Machines, NC	643	41,285	468	32,059
Milling Machines, Profiling, Dupl. & Die Sinking, non-NC	15	864	31	1,896
Milling Machines, Knee Type, non-NC	2,753	16,625	3,127	18,442
Milling Machines, Bed Type, non-NC	214	6,447	314	11,021
Milling Machines, non-NC, N.E.C.	1,141	22,141	2,277	39,657
Vertical Boring Machines, incl. VTL's NC	27	5,654	10	2,543
Vertical Boring Machines, incl. VTL's, non-NC	90	2,452	41	1,538
Boring Machines, NC, N.E.C.	44	5,921	14	3,018
Boring Machines, non-NC, N.E.C.	357	24,218	368	10,729
Horizontal Lathes, Multi-Spindle, NC	116	12,875	170	20,144
Horizontal Lathes, Single Spindle, Less Than 25 HP, NC	3,006	172,050	3,459	216,283
Horizontal Lathes, Single Spindle, 25-50 HP, NC	417	44,610	522	64,495
Horizontal Lathes, Single Spindle, Over 50 HP, NC	157	12,767	57	3,974
Horizontal Engine & Toolroom Lathes, non-NC	3,039	23,843	3,381	30,427
Automatic Chucking Lathes, Single Spindle, non-NC	84	3,069	51	1,135
Automatic Chucking Lathes, Multi-Spindle, non-NC	37	5,170	20	1,579
Automatic Bar Machines, Single Spindle, non-NC	52	2,472	119	3,394
Automatic Bar Machines, Multi-Spindle, non-NC	46	2,229	45	2,237
Horizontal Lathes, non-NC, N.E.C.	193	2,842	265	4,977
Vertical Lathes, Multi-Spindle, NC	103	7,557	67	9,412
Vertical Lathes, NSPF, NC	219	21,702	174	16,470
Vertical Lathes, excl. VTL's, non-NC	988	20,333	1,099	22,400
Gear Tooth Grinding & Finishing Machines	335	26,541	524	24,538
Tool & Cutter Grinding Machines, NC	48	2,392	106	7,240
Tool & Cutter Grinding Machines, non-NC	1,030	19,225	1,136	32,896
Honing & Lapping Machines	305	13,078	329	16,200
Grinding Machines, Flat Surface, NC	45	4,280	62	8,236
Grinding Machines, Flat Surface Reciprocating Table, non-NC	312	4,881	732	11,511
Grinding Machines, Flat Surface, non-NC, N.E.C.	2,048	27,564	2,053	24,055
Grinding & Polishing Machines, NC, N.E.C.	167	30,744	183	26,937
External Grinding Machines, non-NC	259	10,277	340	12,823
Internal Grinding Machines, non-NC	27	2,553	50	4,463
Grinding, Polishing & Buffing Machines, non-NC, N.E.C.	107	8,201	165	6,227
Grinding Machines, non-NC, N.E.C.	1,537	54,414	1,409	44,146

Footnotes at the end of Table.

(Continued)

U.S. IMPORTS OF METAL CUTTING MACHINE TOOLS AND PARTS

By Machine Classification, 1987 and 1988

(Values in Thousands of Dollars)
(Continued)

Machine Classification	1987		1988	
	Units	Value	Units	Value
Traveling Wire Electrical Discharge Machines	626	$ 42,539	860	$ 65,295
All Other Electrical Discharge Machines	377	18,710	359	15,728
Spark Erosion, Ultrasonic & Electrolytic Machines, NC	114	16,233	110	14,287
Spark Erosion, Ultrasonic & Electrolytic Machines, non-NC	232	7,888	831	16,604
Metal Cutting Machine Tools, NC, N.E.C.	122	70,810	283	18,286
Sawing & Cut-off Machines, non-NC	1,527	17,956	1,903	25,558
Broaching Machines, non-NC	88	4,504	119	3,024
Metal Cutting Machine Tools, non-NC, N.E.C.	1,360	44,250	1,651	43,419
Metal Cutting Machine Tools, Less Than $2,500	1,090,016	99,106	1,041,115	107,246
Metal Cutting Machine Tools, Used or Rebuilt	4,671	19,813	1,962	20,983
Parts	—	367,121	—	300,900E

E - Estimated. N.E.C. - Not Elsewhere Classified.

(a) The data may not add to totals due to rounding.

Source: U.S. Department of Commerce, Bureau of Census, "IM 146."

U.S. IMPORTS OF METAL FORMING MACHINE TOOLS AND PARTS

By Machine Classification, 1987 and 1988

(Values in Thousands of Dollars)

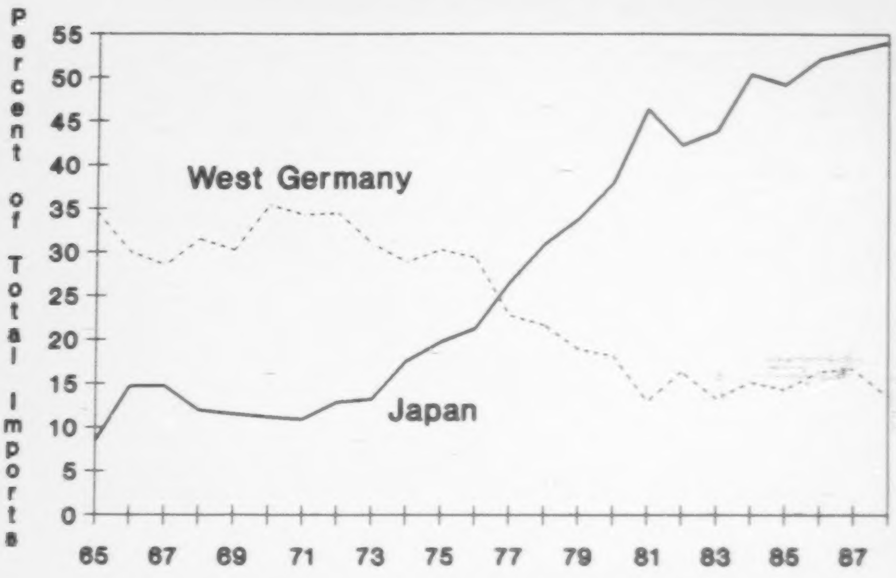
Machine Classification	1987		1988	
	Units	Value	Units	Value
GRAND TOTAL	35,657	$609,301(a)	39,460	$575,582(E,a)
Complete New Machines	35,126	$552,775	38,912	$509,708
Die Casting Machines	448	19,686	514	43,685
Punching & Shearing Machines, incl. Combination, NC	319	42,282	273	30,699
Shearing Machines, non-NC	725	15,464	662	11,575
Punching & Combination Punching & Shearing Machines, non-NC	572	9,384	570	11,374
Bending, Folding, Straightening & Flattening Machines, NC	224	16,905	276	20,204
Press Brakes, non-NC	654	17,206	570	18,004
Bending Rolls, Ram & Press Bending Machines non-NC	125	1,691	92	1,598
Bending, Folding, Str. & Flattening Machines, non-NC, N.E.C.	1,124	25,518	1,125	35,677
Metal Forming Machine Tools, NC, N.E.C.	116	22,453	163	48,263
Mechanical Presses, non-NC	1,310	114,622	417	56,926
Hydraulic Presses, Vertical, Single Action, non-NC	262	43,084	78	36,697
Hydraulic & Pneumatic Presses, non-NC, N.E.C.	614	125,021	939	89,978
Headers & Upsetters, non-NC	130	8,214	98	10,021
Forging Machines, non-NC, N.E.C.	173	12,841	117	14,227
Metal Forming Machine Tools, non-NC, N.E.C.	1,824	68,693	2,597	69,489
Metal Forming Machine Tools, Less Than $2,500	26,506	9,670	30,421	11,292
Metal Forming Machine Tools, Used or Rebuilt	531	6,712	548	5,674
Parts	—	49,814	—	60,200

E - Estimated. N.E.C. - Not Elsewhere Classified.

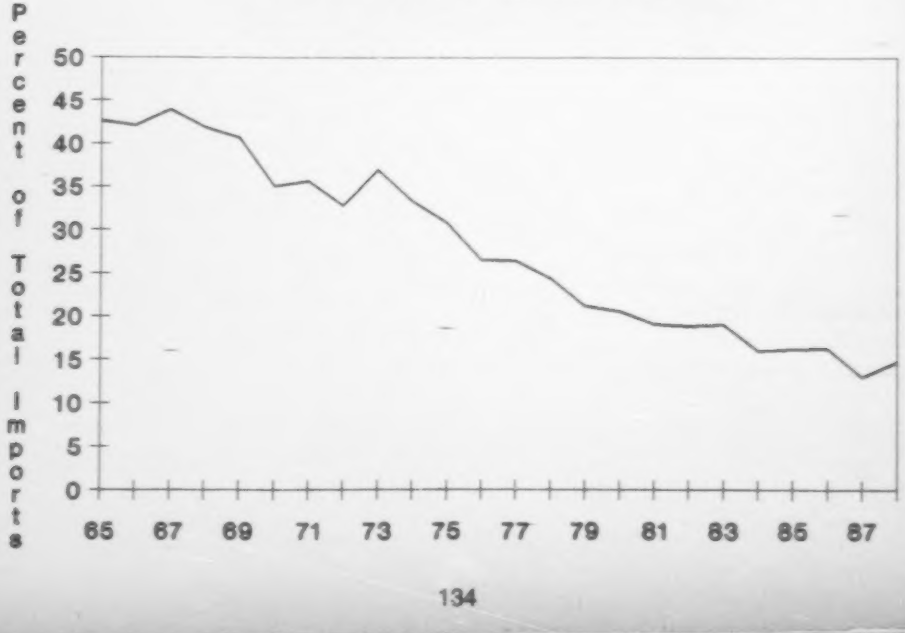
(a) The data may not add to totals due to rounding.

Source: U.S. Department of Commerce, Bureau of Census, "IM 146."

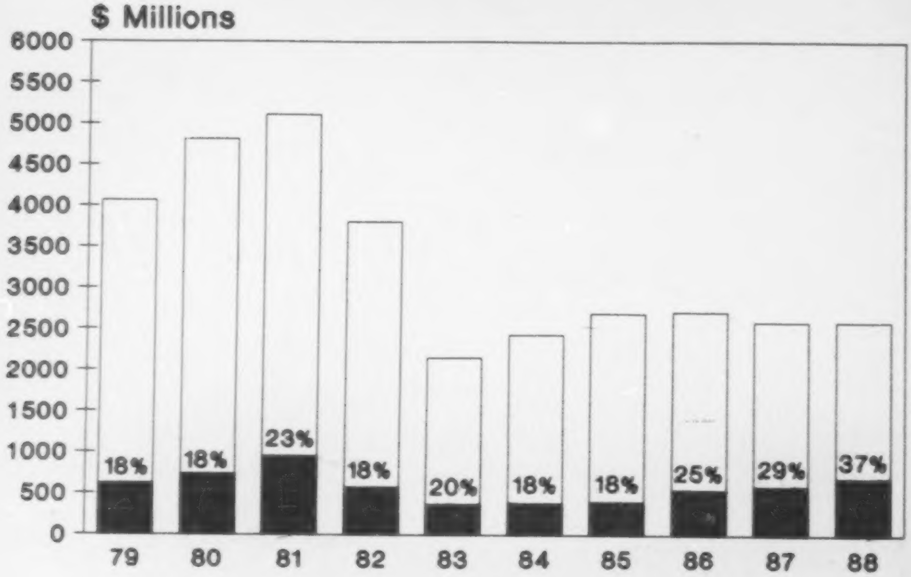
U. S. Machine Tool Imports From West Germany and Japan



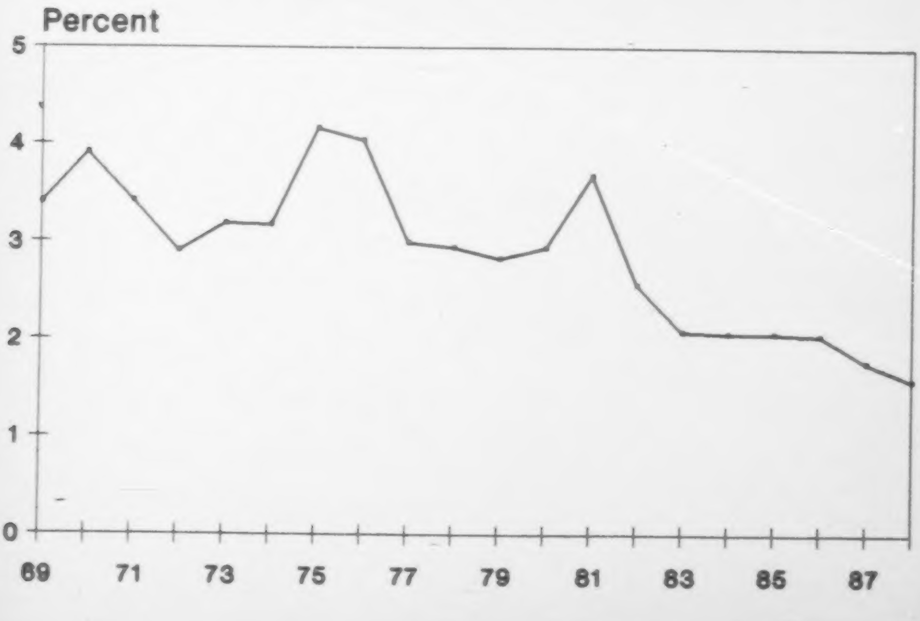
U. S. Machine Tool Imports From France, Italy, Switzerland and the United Kingdom



U.S. Shipments and Exports
of New Machine Tools



U. S. Machine Tool Exports
% of World Machine Tool Consumption



U.S. EXPORTS OF MACHINE TOOLS

Cutting and Forming By Destination, 1979 to Date

(Millions of Dollars)

Destination	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
GRAND TOTAL	$648.8	$785.3	$1,027.6	$615.0	$406.0	$409.3	$452.4	$590.3	$650.4	$768.3
EUROPE	212.3	228.0	231.8	163.6	128.6	110.0	101.4	161.1	154.3	189.4
Austria	.9	1.8	1.3	1.2	2.3	.2	.7	1.1	17.2	1.3
Belgium	4.1	3.6	4.9	2.9	1.5	4.3	2.3	23.5	12.6	7.6
Denmark	3.1	3.1	1.3	1.4	.4	.8	1.0	.4	1.1	2.1
Finland	1.9	1.5	1.8	6.3	1.1	.4	.8	.4	1.0	1.1
France	20.4	21.3	29.2	19.2	12.5	11.6	6.7	10.6	12.2	16.8
Germany, West	28.5	33.7	35.2	21.8	30.9	21.4	23.1	37.0	32.0	40.4
Greece	4.5	1.1	1.4	1.6	.3	.3	.3	.1	.1	3.8
Ireland	2.9	3.5	11.4	4.2	4.5	4.0	2.2	2.2	2.0	3.7
Italy	17.5	13.4	16.7	14.9	15.5	6.8	11.2	16.8	16.0	21.3
Netherlands	5.3	7.8	7.4	3.3	2.7	2.0	2.9	3.5	4.6	7.4
Norway	2.3	1.9	1.0	.6	.3	.9	.7	.8	1.3	.9
Poland	3.1	2.1	(a)	.3	2.0	.6	1.1	.7	4.0	.1
Portugal	.4	.4	2.1	.1	(a)	.3	.2	.2	1.1	2.0
Romania	6.6	3.3	1.5	3.3	(a)	0	0	0	.1	0
Spain	4.6	13.5	14.2	6.3	2.1	2.7	3.7	3.2	2.8	7.2
Sweden	4.0	11.0	5.5	5.0	2.7	4.1	3.6	5.8	6.4	3.6
Switzerland	6.2	12.5	9.2	7.1	5.3	5.3	3.6	6.4	5.7	4.7
United Kingdom	83.7	62.9	64.1	59.8	35.0	40.8	31.2	43.3	24.9	57.7
U.S.S.R.	7.3	25.8	16.5	1.3	7.5	.6	1.2	1.3	3.2	1.3
Yugoslavia	3.6	2.1	4.8	1.1	.7	.9	.5	1.6	1.6	1.1
All Other	.4	1.7	2.3	1.8	1.4	2.0	4.5	2.2	4.5	4.9
NORTH AND CENTRAL AMERICA	167.9	304.4	520.5	221.6	108.1	132.5	149.1	181.2	191.3	239.5
Canada	95.4	162.4	256.1	82.3	61.7	82.6	82.0	85.0	98.5	108.7
Mexico	67.7	135.7	258.9	135.9	42.5	45.7	63.8	93.9	89.1	126.8
All Other	4.8	6.3	5.5	3.3	3.8	4.2	3.4	2.3	3.8	3.9
SOUTH AMERICA	89.5	64.5	62.1	51.5	18.4	33.6	37.2	29.1	47.4	59.6
Argentina	8.0	13.8	7.7	8.2	1.9	3.7	1.1	1.2	2.5	4.1
Brazil	23.8	19.2	24.2	21.0	10.9	18.5	24.6	16.5	24.9	21.0
Chile	2.3	2.3	2.2	2.0	.3	1.8	.1	1.7	1.1	1.9
Colombia	4.1	5.6	4.6	3.4	1.7	3.2	3.8	1.8	3.3	5.0
Ecuador	4.0	1.6	3.9	1.3	.4	.5	.1	.4	.9	.8
Peru	1.7	2.2	3.5	.9	.1	.4	.3	1.1	.8	1.4
Venezuela	45.2	18.9	15.1	14.3	2.9	5.3	7.0	6.5	13.6	25.2
All Other	.4	.9	.9	.3	.1	.2	.1	(a)	.3	.2

Footnotes at the end of Table.

(Continued)

U.S. EXPORTS OF MACHINE TOOLS -
Cutting and Forming By Destination, 1979 to Date

(Millions of Dollars)
(Continued)

Destination	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
ASIA	$151.9	$158.8	$163.6	$141.5	$131.6	$116.1	$138.0	$206.6	$238.8	$257.5
China	9.3	6.7	1.5	2.4	16.6	13.0	26.6	50.5	42.5	37.4
Hong Kong	1.6	4.0	10.2	2.5	2.2	3.1	4.5	2.2	4.1	7.3
India	4.4	9.7	15.2	15.4	5.4	6.4	6.6	9.9	5.7	10.7
Israel	10.9	12.4	7.7	6.8	7.0	8.2	5.4	5.0	2.3	6.1
Japan	48.3	59.1	54.2	51.0	35.7	39.4	36.2	52.1	55.4	64.1
Korea, Republic of	34.1	24.3	15.0	11.2	8.8	8.3	14.9	31.4	85.9	73.2
Philippines	2.6	3.3	3.2	5.2	2.0	1.3	1.2	.5	.8	1.6
Saudi Arabia	15.2	10.9	14.9	17.3	21.8	12.1	3.0	9.2	.9	2.2
Singapore	6.3	5.5	13.7	14.7	9.3	5.1	12.4	8.1	10.0	9.3
Taiwan	10.1	15.3	16.2	8.1	9.2	5.2	6.6	11.7	12.0	25.6
Turkey	1.5	.4	1.4	1.2	3.4	6.7	6.8	18.4	12.2	6.6
All Other	7.5	7.2	10.3	5.8	10.2	7.4	13.9	7.5	7.0	13.4
OCEANIA	17.0	12.2	22.7	12.7	9.1	7.6	15.4	8.9	12.4	16.5
Australia	15.4	10.7	21.6	11.1	8.0	7.3	14.6	8.1	11.4	14.3
New Zealand	1.6	1.4	.7	1.4	1.0	.3	.7	.7	.9	2.2
All Other	(a)	.1	.4	.1	.1	(a)	(a)	.1	.1	(a)
AFRICA	10.2	17.3	26.9	24.0	10.1	9.4	11.1	3.3	6.2	5.8
Egypt	.9	2.5	6.3	3.9	2.2	4.0	2.7	.7	.9	.5
South Africa	5.6	11.8	16.9	10.5	5.4	3.8	4.6	1.5	2.1	2.7
All Other	3.7	3.0	3.7	9.6	2.4	1.6	3.8	1.1	3.2	2.6

(a) Less than $50,000 and/or included in "All Other."

Note: Individual items may not add to totals due to rounding. These figures represent exports of domestic merchandise; value at U.S. port. The figures are lower than those for total exports because they include used machines but exclude parts. They are higher than manufacturers' export shipments because the latter are priced f.o.b. factory and exclude export shipments made by other than manufacturers.

Source: U.S. Bureau of the Census, "EM 522."

U.S. EXPORTS OF METAL CUTTING MACHINE TOOLS

By Country of Destination, 1979 to Date

(Millions of Dollars)

Destination	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
GRAND TOTAL	$408.0	$495.4	$724.0	$403.5	$258.3	$250.2	$285.9	$371.3	$383.5	$443.7
EUROPE	144.7	150.0	153.6	112.1	84.4	71.4	64.6	107.3	101.4	101.5
Austria	.8	1.4	1.2	1.0	1.9	.1	.6	.4	16.9	.8
Belgium	2.2	.8	1.6	2.1	.8	3.3	1.4	20.9	11.5	6.1
Denmark	1.3	1.3	.5	.8	(a)	.4	.8	.2	.8	.7
Finland	1.8	1.4	1.3	2.4	.3	.1	.8	.1	.5	.2
France	11.1	10.6	19.1	13.9	5.1	4.1	3.6	4.6	5.8	7.6
Germany, West	17.3	22.8	27.3	16.5	17.0	12.7	12.1	20.9	19.5	17.8
Greece	1.4	.6	.3	.7	.1	.2	(a)	.1	(a)	3.7
Ireland	1.1	2.5	3.0	1.9	1.8	3.1	1.5	.9	.7	1.5
Italy	11.1	9.7	10.1	6.5	8.7	6.0	8.9	6.7	10.5	13.1
Netherlands	3.9	5.0	1.5	1.3	1.2	.7	1.7	2.4	1.8	2.9
Norway	1.8	.9	.7	.4	.1	.7	.3	.3	.3	.3
Poland	2.7	2.1	(a)	.2	1.5	.5	.9	.4	3.6	.1
Portugal	.2	.3	1.6	.1	(a)	.1	.2	(a)	.2	1.6
Romania	1.3	2.3	1.4	1.2	(a)	0	0	0	.1	0
Spain	3.3	3.1	8.2	4.0	1.4	1.1	3.0	2.0	1.1	2.1
Sweden	3.2	7.5	3.5	2.2	1.5	3.6	3.2	2.9	3.2	2.2
Switzerland	5.3	8.9	7.8	5.4	5.2	2.0	2.6	4.9	3.9	2.9
United Kingdom	67.4	42.8	46.7	49.3	29.5	30.6	19.9	35.8	15.0	32.4
U.S.S.R.	4.6	23.6	15.1	1.2	7.4	.6	.4	1.0	2.1	1.2
Yugoslavia	2.4	1.1	1.8	.5	.6	.7	.3	1.1	1.4	.2
All Other	.4	1.3	.9	.4	.1	.8	2.3	1.6	2.4	4.1
NORTH AND CENTRAL AMERICA	108.1	205.1	401.8	137.5	60.8	79.6	91.7	109.0	117.6	152.1
Canada	60.4	116.2	208.0	57.6	33.8	45.4	49.3	43.6	60.5	61.5
Mexico	44.8	86.2	190.8	78.0	24.6	31.4	40.3	63.8	54.9	89.0
All Other	2.9	2.7	3.0	1.9	2.4	2.8	2.1	1.7	2.2	1.6
SOUTH AMERICA	37.9	33.0	33.2	33.8	12.1	26.0	30.1	21.8	27.7	32.9
Argentina	3.7	6.5	4.3	6.0	1.1	2.0	1.1	.8	1.6	1.4
Brazil	18.5	14.6	14.7	16.2	8.0	17.4	20.9	14.3	15.6	10.7
Chile	.6	.9	1.3	.6	.2	1.6	.1	.7	.8	1.2
Colombia	1.4	3.2	2.1	2.5	.9	2.3	2.2	1.5	2.4	3.1
Ecuador	1.3	.7	1.7	.5	.1	.5	.1	.3	.7	.2
Peru	.5	.6	.6	.8	(a)	.3	.3	.6	.7	.9
Venezuela	11.5	5.9	7.9	7.0	1.6	1.8	5.5	3.6	5.7	15.2
All Other	.3	.6	.6	.1	.1	.2	(a)	0	.2	.2

Footnotes at the end of Table.

(Continued)

U.S. EXPORTS OF METAL CUTTING MACHINE TOOLS
By Country of Destination, 1979 to Date
(Millions of Dollars)
(Continued)

Destination	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
ASIA	$100.6	$90.8	$105.9	$100.4	$92.7	$66.4	$91.5	$127.3	$129.0	$150.0
China	8.8	3.9	1.3	2.0	13.1	10.1	21.7	34.8	22.1	27.1
Hong Kong	1.3	.9	1.8	1.5	1.6	2.3	3.1	1.9	2.3	3.0
India	3.4	7.0	10.4	11.7	4.2	2.8	4.4	7.7	4.5	8.3
Israel	6.3	4.3	5.3	4.0	3.0	2.8	3.6	2.4	1.9	3.7
Japan	31.1	38.6	40.8	36.6	30.1	23.8	20.1	35.8	29.3	30.0
Korea, Republic of	24.2	16.4	12.7	9.0	6.0	6.7	9.8	19.2	44.3	48.2
Philippines	1.6	1.6	1.9	4.0	1.5	.1	.6	.3	.7	.7
Saudi Arabia	7.4	4.7	8.0	8.3	9.0	2.6	2.1	.4	.6	.6
Singapore	5.2	3.8	10.4	11.6	6.3	2.3	7.4	5.1	5.2	6.8
Taiwan	6.9	6.5	6.5	7.3	7.8	4.2	3.8	4.1	7.5	13.0
Turkey	1.5	.3	.9	.7	2.6	5.0	5.2	10.4	7.4	4.5
All Other	2.8	2.8	5.8	3.8	7.5	3.7	9.7	5.4	3.3	4.2
OCEANIA	9.8	5.5	15.9	6.7	4.0	2.2	4.5	4.2	6.1	3.9
Australia	8.6	4.9	15.3	6.1	3.2	2.0	4.0	3.9	5.9	3.6
New Zealand	1.2	.5	.3	.6	.6	.2	.5	.2	.2	.3
All Other	(a)	(a)	.3	.1	.1	(a)	0	.1	.1	(a)
AFRICA	6.9	10.8	13.5	12.8	4.2	4.5	3.4	1.5	1.6	3.2
Egypt	.7	1.8	3.2	2.4	.7	2.0	1.4	.3	.3	.3
Rep. of South Africa	4.7	7.8	8.5	7.8	2.8	1.5	.9	.6	1.0	2.5
All Other	1.5	1.2	1.8	2.8	.8	1.1	1.0	.6	.3	.5

(a) Less than $50,000 and/or included in "All Other."

NOTE: Individual items may not add to totals due to rounding. Figures include used machine tools but exclude parts.

Source: U.S. Bureau of the Census, "EM 522."

U.S. EXPORTS OF METAL FORMING MACHINE TOOLS

By Country of Destination, 1979 to Date

(Millions of Dollars)

Destination	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
GRAND TOTAL	$240.8	$290.0	$303.6	$211.5	$147.7	$159.1	$166.5	$219.1	$266.9	$324.6
EUROPE	67.6	78.1	78.2	51.4	44.3	38.6	36.8	53.8	52.9	87.9
Austria	.1	.4	.1	.2	.4	.1	(a)	.7	.3	.5
Belgium	1.8	2.9	3.2	.8	.7	1.0	.9	2.6	1.1	1.5
Denmark	1.8	1.7	.8	.6	.3	.5	.2	.2	.3	1.4
Finland	.1	.1	.5	3.9	.8	.3	.1	.3	.4	.9
France	9.3	10.6	10.0	5.3	7.4	7.5	3.1	6.1	6.4	9.2
Germany, West	11.1	10.9	7.9	5.3	13.9	8.8	10.9	16.1	12.5	22.6
Greece	3.1	.6	1.1	.9	.3	.1	.2	(a)	.1	.1
Ireland	1.8	1.1	8.5	2.3	2.7	.8	.7	1.2	1.3	2.3
Italy	6.4	3.7	6.7	8.5	6.8	.8	2.3	10.1	5.4	8.1
Netherlands	1.5	2.8	5.9	2.0	1.5	1.4	1.2	1.1	2.6	4.6
Norway	.5	1.0	.3	.2	.2	.2	.4	.5	.9	.6
Poland	.4	(a)	0	(a)	.5	.1	.2	.3	.3	(a)
Portugal	.2	.2	.5	(a)	(a)	.2	(a)	.2	.9	.4
Romania	5.3	1.0	.1	2.1	0	0	0	0	0	0
Spain	1.3	10.4	6.0	2.3	.6	1.4	.7	1.2	1.7	5.2
Sweden	.8	3.4	2.0	2.9	1.1	.6	.4	2.9	3.3	1.4
Switzerland	.9	3.6	1.4	1.7	.2	3.3	1.0	1.5	1.8	1.7
United Kingdom	16.3	20.2	17.3	10.5	5.6	10.2	11.3	7.5	10.0	25.4
U.S.S.R.	2.7	2.2	1.4	.1	(a)	.1	.7	.2	1.0	.1
Yugoslavia	1.3	1.0	3.1	.6	(a)	.2	.2	.5	.2	.9
All Other	1.0	.1	1.4	1.5	1.3	1.2	2.2	.7	2.1	.9
NORTH AND CENTRAL AMERICA	59.8	99.4	118.8	84.1	47.3	52.9	57.4	72.1	73.7	87.4
Canada	34.9	46.2	48.2	24.7	28.0	37.2	32.7	41.4	38.0	47.2
Mexico	22.9	49.5	68.1	57.9	17.9	14.4	23.5	30.1	34.1	37.9
All Other	2.0	3.7	2.5	1.5	1.4	1.4	1.2	.6	1.6	2.3
SOUTH AMERICA	51.7	31.6	28.8	17.7	6.3	7.6	7.1	7.4	19.7	26.7
Argentina	4.3	7.3	3.4	2.2	.8	1.7	.1	.4	.9	2.7
Brazil	5.3	4.7	9.5	4.8	3.0	1.1	3.8	2.3	9.3	10.3
Chile	1.7	1.4	.9	1.4	(a)	.2	(a)	1.0	.4	.7
Colombia	2.6	2.4	2.5	.9	.8	.9	1.6	.3	.9	1.9
Ecuador	2.6	.9	2.2	.8	.3	.1	(a)	.1	.2	.6
Peru	1.2	1.6	2.9	.1	.1	.1	.1	.5	.1	.5
Venezuela	33.7	13.0	7.2	7.3	1.3	3.5	1.5	2.9	8.0	10.0
All Other	.3	.3	.2	.2	(a)	.1	(a)	(a)	(a)	(a)

Footnotes are at the end of the Table. (Continued)

U.S. EXPORTS OF METAL FORMING MACHINE TOOLS
By Country of Destination, 1979 to Date
(Millions of Dollars)
(Continued)

Destination	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
ASIA	$51.2	$67.9	$57.7	$41.1	$38.9	$49.6	$46.5	$79.3	$109.8	$107.5
China	.5	2.8	.2	.4	3.6	2.8	4.9	15.7	20.4	10.3
Hong Kong	.3	3.0	8.4	1.0	.6	.8	1.3	.3	1.8	4.3
India	1.0	2.7	4.8	3.7	1.1	3.6	2.2	2.2	1.2	2.3
Israel	4.6	8.1	2.4	2.8	4.0	5.4	1.9	2.6	.4	2.4
Japan	17.1	20.5	13.4	14.4	5.6	15.6	16.1	16.4	26.1	34.2
Korea, Republic of	9.9	7.9	2.3	2.3	2.8	1.6	5.1	12.2	41.5	25.0
Philippines	1.0	1.7	1.3	1.2	.6	1.1	.6	.3	.2	.9
Saudi Arabia	7.8	6.3	6.9	9.0	12.8	9.4	.9	8.8	.3	1.6
Singapore	1.1	1.6	3.3	3.1	2.9	2.8	5.0	3.0	4.8	2.5
Taiwan	3.2	8.8	9.7	.8	1.4	.9	2.8	7.6	4.5	12.6
Turkey	(a)	.1	.5	.5	.8	1.7	1.6	8.1	4.8	2.2
All Other	4.7	4.4	4.4	2.0	2.8	3.7	4.3	2.2	3.8	9.2
OCEANIA	7.2	6.7	6.7	5.9	5.1	5.5	10.9	4.7	6.2	12.6
Australia	6.8	5.8	6.2	5.0	4.7	5.3	10.6	4.3	5.5	10.7
New Zealand	.4	.8	.4	.9	.4	.1	.3	.4	.7	1.9
All Other	(a)	(a)	.1	.1	0	(a)	(a)	0	(a)	(a)
AFRICA	3.3	6.3	13.4	11.2	5.8	4.9	7.8	1.8	4.6	2.6
Egypt	.2	.8	3.1	1.5	1.5	2.1	1.3	.4	.6	.2
Rep. of South Africa	.9	4.0	8.3	2.7	2.7	2.3	3.7	.8	1.1	.3
All Other	2.2	1.6	2.0	7.0	1.7	.5	2.8	.5	3.0	2.2

(a) Less than $50,000 and/or included in "All Other."

Note: Individual items may not add to totals due to rounding. Figures include used machine tools but exclude parts.

Source: U.S. Bureau of the Census, "EM 522."

U.S. EXPORTS OF METAL CUTTING MACHINE TOOLS AND PARTS

By Machine Classification, 1979 to 1986

(Millions of Dollars)

Machine Classification	1979	1980	1981	1982	1983	1984	1985	1986
GRAND TOTAL	$544.9	$674.6	$974.2	$630.5	$430.8	$446.0	$494.6	$564.9
Complete New Machines	392.5	462.8	668.6	375.6	230.6	223.5	242.5	335.2
Machining Centers, N.C.								
Vertical, A.T.C.	14.1	9.3	11.4	6.1	3.3	3.2	4.0	5.4
Horizontal, A.T.C.	28.5	24.3	27.0	19.1	4.2	10.5	8.0	7.6
Other	2.8	23.2	15.0	8.8	5.8	4.9	9.0	7.5
Vertical Boring-Drilling-Milling	.9	8.2	42.1	4.6	6.1	4.8	5.4	6.0
Horizontal Boring-Drilling-Milling	14.4	5.8	12.9	8.9	2.9	4.5	7.5	5.9
Vertical Boring and Turning Mills (incl. Vertical Turret Lathes)	10.6	13.6	18.7	14.5	5.7	5.9	4.5	27.8
Boring-Drilling-Milling, N.E.C.	6.5	5.5	5.7	4.4	3.9	2.4	6.0	6.5
Drilling, Vertical (Upright)	2.0	1.4	2.9	.8	2.5	.1	.3	.2
Multiple Spindle	3.6	11.5	7.8	3.6	.7	4.9	1.8	8.6
Radial	1.3	1.9	2.0	1.3	1.2	.2	.5	.5
Other	9.9	7.5	11.7	6.7	4.0	5.1	4.4	6.1
Gear Hobbers and Shapers (b)	2.1	8.8	22.7	5.3	1.6	3.0	3.4	8.1
Gear Tooth Grinding & Finishing	4.4	14.0	18.1	9.2	3.3	5.3	3.4	6.7
Other Gear Cutting (g)	37.3	38.4	39.3	22.7	7.0	9.0	13.7	20.8
External Cylindrical Grinding	13.2	9.3	15.9	7.2	3.9	3.9	5.1	3.0
Surface Grinding	11.4	16.8	26.2	17.4	12.6	9.8	12.7	16.7
Tool and Cutter Grinding	5.7	9.2	9.5	6.5	5.1	2.8	8.4	5.3
Polishing and Buffing	2.9	5.2	11.2	8.1	3.6	10.1	9.0	8.1
Honing and Lapping	3.8	3.9	9.5	3.3	2.9	2.4	3.4	8.8
Internal Cylindrical Grinding	5.9	7.8	5.1	4.3	1.4	1.7	2.0	2.2
Other Grinding and Polishing (c)	23.1	32.7	49.0	24.3	19.6	16.0	16.1	16.3
Engine Lathes	6.1	3.0	5.6	2.4	3.5	2.7	2.2	1.2
Turret Lathes (Excl. Vertical)	7.0	(f)	(f)	(f)	(f)	(f)	(f)	(f)
Automatic Chucking Lathes								
Single Spindle	12.4	5.6	7.5	2.3	2.7	3.0	.5	1.9
Multiple Spindle	4.9	3.6	4.3	2.3	1.0	4.8	1.2	0.6
Automatic Screw Machines	6.3	9.8	10.9	4.6	3.2	4.5	2.5	2.3
Other Lathes	16.3	45.1	61.8	58.8	24.5	24.5	45.5	53.0
Milling Machines								
Knee Type	3.4	1.1	.5	.8	1.5	.2	.1	.5
Bed Type	2.8	2.8	2.0	.3	.1	.3	7.8	3.3
Profile, Dup. & Die Sinking	4.9	2.9	5.5	1.6	1.5	.3	.9	4.7
Other	12.3	12.4	29.8	19.6	10.8	21.9	10.5	16.8
Broaching	2.4	6.9	15.5	13.3	1.4	1.1	1.0	.6
Planers, Other than Gear Shapers and Slotters	1.6	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Sawing and Cutoff	12.5	12.2	12.6	8.8	9.1	9.6	10.6	8.4
Tapping	1.9	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Threading	9.9	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Electrical Discharge	5.2	10.2	5.2	3.2	5.8	3.6	5.1	2.5
Single Station (Way Type)	.4	51.7	97.2	38.4	21.1	5.2	4.3	37.5
Multi-Station	42.9							
Metal Cutting Machine Tools, N.E.C.								
$2,500 and Over, New (d)	14.5	21.1	27.1	20.1	13.2	21.9	12.1	10.9
Less than $2,500, New (e)	20.5	15.9	19.0	13.7	10.3	9.5	9.6	13.0
Used and Rebuilt Machines	15.5	32.6	56.4	27.9	27.7	26.7	43.4	36.1
Parts	136.9	179.2	250.2	226.9	172.5	195.8	208.7	193.6

N.E.C. - Not Elsewhere Classified.

(a) Included in "Metal Cutting Machine Tools, N.E.C."
(b) "Gear Hobbers" for years prior to 1978.
(c) "Other Grinding" for years prior to 1978.
(d) "$1,000 and Over" for years prior to 1978.
(e) "Less than $1,000" for years prior to 1978.
(f) Included in "Other Lathes."
(g) Data for years 1979 to 1982 may be inaccurate due to a reporting error by exporters.

Note: Individual items may not add to totals due to rounding.

Source: U.S. Bureau of the Census, "EM 522."

U.S. EXPORTS OF METAL FORMING MACHINE TOOLS AND PARTS

By Machine Classification, 1979 to 1986

(Millions of Dollars)

Machine Classification	1979	1980	1981	1982	1983	1984	1985	1986
GRAND TOTAL	$333.7	$424.6	$471.4	$371.9	$261.1	$289.0	$277.6	$343.2
Complete New Machines	226.6	271.4	281.0	198.9	128.4	150.0	158.0	211.5
Punching and Shearing Machines	22.3	44.8	44.9	32.9	18.1	22.6	18.1	21.8
Bending and Forming Machines	45.7	44.5	46.0	35.1	19.7	19.4	30.3	33.9
Hydraulic and Pneumatic Presses	32.6	42.0	56.4	29.9	19.6	16.7	25.8	48.6
Mechanical Presses, O.B.I. Other Mechanical Presses	19.2	27.7	22.9	23.9	10.4	19.3	15.8	14.8
Headers and Upsetters	13.2	4.4	7.7	7.2	3.7	7.5	8.3	11.5
Forging Machines (except Presses)	7.0	12.0	13.6	8.1	4.2	4.2	3.9	8.2
Metal Container-making Machines	32.9	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Metal Forming Machines, N.E.C. Metalworking Machines, N.E.C., $2,500 and over (a)	46.5	92.4(b)	83.1(b)	57.6(b)	49.1(b)	57.2(b)	52.1(b)	69.8(b)
Metal Forming Mach. Tools under $2,500 (b)	7.2	7.1	6.1	4.2	3.7	2.9	3.5	2.8
Used and Rebuilt Machines	14.2	18.6	22.6	12.5	19.2	9.1	8.5	7.6
Parts	92.9	134.7	167.8	160.5	113.4	129.9	111.1	124.1

N.E.C. - Not Elsewhere Classified.

(a) Included in "Metal Forming Machines, N.E.C."
(b) From 1980 forward "Die Casting Machines & Parts" are included.

Sources: U.S. Bureau of the Census, "EM 522."

U.S. EXPORTS OF METAL CUTTING MACHINE TOOLS AND PARTS

By Machine Classification, 1987 and 1988

(Values in Thousands of Dollars)

Machine Classification	1987 Units	1987 Value	1988 Units	1988 Value
GRAND TOTAL	39,355	$585,842(a)	43,684	$668,720
Complete New Machines	33,927	$338,988	36,381	$383,071
Gear Hobbers and Shapers	59	7,048	90	11,320
Gear Cutting Machines, N.E.C.	113	30,884	94	20,186
Vertical Mach. Ctrs. ATC, NC, Y-Axis Travel 26" or Less	29	1,734	103	8,252
Vertical Mach. Ctrs. ATC, NC, Y-Axis Travel Over 26"	5	739	11	2,923
Horizontal Machining Centers, ATC, NC	24	6,286	46	10,034
Machining Centers, NC, N.E.C.	144	11,815	123	9,598
Single Station and Multi-Station Transfer Machines	23	14,550	23	12,564
Way Type Machines (Unit Heads)	13	2,245	11	1,031
Horiz. Boring-Drilling-Milling Machines, Table Type, NC	11	2,212	3	1,042
Horiz. Boring-Drilling-Milling Machines, NC, N.E.C.	9	1,224	5	1,803
Vertical Boring-Drilling-Milling Machines, NC	12	1,159	13	2,174
Horiz. Boring-Drilling-Milling Machines, non-NC	15	1,508	8	1,074
Vertical Boring-Drilling-Milling Machines, non-NC	73	2,228	39	2,198
Drilling Machines, NC	28	3,235	42	3,559
Drilling Machines, Multi-Spindle, non-NC	46	2,489	28	2,065
Drilling Machines, Radial, non-NC	41	433	21	680
Drilling Machines, Upright, Single Spindle, non-NC	14	246	12	393
Drilling Machines, non-NC, N.E.C.	195	4,096	198	4,540
Milling Machines, NC	82	19,073	21	7,747
Milling Machines, Profiling, Dupl. & Die Sinking, non-NC	19	641	44	6,575
Milling Machines, Knee Type, non-NC	3	92	3	139
Milling Machines, Bed Type, non-NC	2	112	17	1,468
Milling Machines, non-NC, N.E.C.	224	4,826	218	12,276
Vertical Boring Machines, incl. VTL's, NC	5	1,331	3	1,318
Vertical Boring Machines, incl. VTL's, non-NC	140	9,794	135	5,554
Boring Machines, NC, N.E.C.	4	926	6	387
Boring Machines, non-NC, N.E.C.	77	5,255	119	7,872
Horizontal Lathes, Multi-Spindle, NC	17	2,322	57	13,511
Horizontal Lathes, excl. Multi-Spindle, NC, Less Than 25 HP	103	8,383	139	10,930
Horizontal Lathes, excl. Multi-Spindle, NC, 25-50 HP	26	3,647	24	3,957
Horizontal Lathes, excl. Multi-Spindle, NC, Over 50 HP	15	2,947	10	2,756
Horizontal Engine & Toolroom Lathes, non-NC	74	1,157	110	3,164
Automatic Chucking Lathes, Single Spindle, non-NC	8	1,063	22	2,715
Automatic Chucking Lathes, Multi-Spindle, non-NC	19	1,996	11	818
Automatic Bar Machines, Single Spindle, non-NC	44	1,439	32	753
Automatic Bar Machines, Multi-Spindle, non-NC	49	1,922	44	1,908
Horizontal Lathes, non-NC, N.E.C.	508	14,973	408	10,340
Vertical Lathes, Multi-Spindle, excl. VTL's, NC	6	1,342	6	612
Vertical Lathes, excl. Multi-Spindle & VTL's, NC	14	1,401	14	781
Vertical Lathes, excl. VTL's, non-NC	149	9,149	133	7,578
Grinding, Polishing, Honing & Lapping Machines, NC	188	31,060	276	38,597
Gear Tooth Grinding & Finishing Machines, non-NC	26	3,508	52	2,983
Tool & Cutter Grinding Machines, non-NC	238	7,976	432	7,711
Honing & Lapping Machines, non-NC	388	6,852	593	7,263
Grinding Machines, Flat Surface Reciprocating Table, non-NC	117	1,975	151	2,586
Grinding Machines, Flat Surface, non-NC, N.E.C.	368	23,366	394	35,136
External Grinding Machines, non-NC	41	4,043	23	3,927
Internal Grinding Machines, non-NC	34	6,310	45	6,576
Grinding, Polishing & Buffing Machines, non-NC, N.E.C.	188	10,665	365	10,956
Grinding Machines, non-NC, N.E.C.	339	11,480	327	13,089

Footnotes are at the end of the Table. (Continued)

U.S. EXPORTS OF METAL CUTTING MACHINE TOOLS AND PARTS

By Machine Classification, 1987 and 1988

(Values in Thousands of Dollars)

(Continued)

Machine Classification	1987 Units	1987 Value	1988 Units	1988 Value
Traveling Wire Electrical Discharge Machines	17	$ 258	33	$ 1,330
All Other Electrical Discharge Machines	139	3,247	246	3,994
Spark Erosion, Ultrasonic & Electrolytic Machines, NC	19	1,065	18	873
Spark Erosion, Ultrasonic & Electrolytic Machines, non-NC	52	1,845	106	4,046
Metal Cutting Machine Tools, NC, N.E.C.	75	5,047	154	7,124
Sawing & Cut-off Machines, non-NC	467	6,961	679	12,093
Broaching Machines, non-NC	13	383	24	3,596
Metal Cutting Machine Tools, non-NC, N.E.C.	200	10,218	277	6,303
Metal Cutting Machine Tools, Less Than $2.500	28,576	14,664	29,740	16,400
Metal Cutting Machine Tools, Used or Rebuilt	5,628	44,557	7,303	43,684
Parts	—	202,297	—	241,965

N.E.C. - Not Elsewhere Classified.

(a) The data may not add to totals due to rounding.

Source: U.S. Bureau of the Census "EM 522."

U.S. EXPORTS OF METAL FORMING MACHINE TOOLS AND PARTS

By Machine Classification, 1987 and 1988

(Values in Thousands of Dollars)

Machine Classification	1987 Units	1987 Value	1988 Units	1988 Value
GRAND TOTAL	11,924	$424,367(a)	13,000	$532,317
Complete New Machines	11,210	$247,760	11,878	$307,954
Die Casting Machines & Parts	—	17,651	—	20,440
Metal Forming Machine Tools, Less Than $2.500	7,114	4,217	6,051	3,855
Punching & Shearing Machines, incl. Combination, NC	71	8,543	105	16,989
Shearing Machines, non-NC	85	3,566	158	6,553
Punching & Combination Punching & Shearing Mach., non-NC	601	10,398	1,070	24,760
Bending, Folding, Straightening & Flattening Machines, NC	79	5,019	140	7,104
Press Brakes, non-NC	38	1,683	99	4,938
Bending Rolls, Ram & Press Bending Machines, non-NC	16	1,085	20	2,803
Bending, Folding, Str. & Flattening Machines, non-NC, N.E.C.	726	25,552	988	34,291
Mechanical Presses, non-NC	255	22,889	304	28,378
Hydraulic Presses, Vertical, Single Actinn	56	6,733	121	7,794
Hydraulic & Pneumatic Presses	759	41,441	1,117	53,021
Headers & Upsetters, non-NC	90	15,865	94	22,793
Forging Machines, non-NC, N.E.C.	190	8,038	171	4,265
Metal Forming Machine Tools, non-NC, N.E.C.	1,130	75,039	1,440	69,986
Metal Forming Machine Tools, Used or Rebuilt	714	19,121	1,122	16,671
Parts	—	157,486	—	207,692

N.E.C. - Not Elsewhere Classified.

(a) The data may not add to totals due to rounding.

Source: U.S. Bureau of the Census, "EM 522."

U.S. FOREIGN TRADE IN MACHINE TOOLS AND PARTS

1959 to Date

(Millions of Dollars)

	Exports of Domestic Merchandise (Value at U.S. Port)			Imports for Consumption (Value in Foreign Country)		
Year	TOTAL	Metal Cutting	Metal Forming	TOTAL	Metal Cutting	Metal Forming
1959	$ 135.0	$ 82.2	$ 52.8	$ 32.5	$ 23.8	$ 8.7
1960	192.5	127.8	64.7	35.7	26.3	9.4
1961	270.2	191.6	78.6	32.4	22.6	9.8
1962	303.9	205.3	98.6	37.5	28.4	9.1
1963	220.6	144.9	75.7	45.1	33.4	11.7
1964	300.8	204.8	96.0	45.6	38.1	7.5
1965	287.2	191.6	95.6	68.9	58.9	10.0
1966	273.6	176.3	97.3	137.4	121.2	16.2
1967	294.5	199.6	94.9	203.7	174.8	28.9
1968	286.0	178.2	107.8	191.3	166.1	25.2
1969	323.5	201.1	122.4	182.6	153.4	29.2
1970	403.9	268.8	135.1	158.5	126.1	32.4
1971	351.0	210.3	140.7	109.6	87.4	22.2
1972	332.1	186.7	145.4	141.8	104.2	37.6
1973	443.0	248.7	194.3	211.6	164.6	47.0
1974	566.5	320.8	245.7	330.3	261.3	69.0
1975	705.9	417.3	288.6	382.4	303.0	79.4
1976	682.7	362.7	320.0	383.3	293.6	89.7
1977	579.5	321.4	258.1	482.2	386.7	95.5
1978	738.6	453.7	284.9	832.4	681.6	150.7
1979	878.6	544.9	333.7	1,269.5	1,027.6	241.9
1980	1,099.2	674.6	424.6	1,556.9	1,282.2	274.7
1981	1,445.6	974.2	471.4	1,712.9	1,485.1	227.8
1982	1,002.4	630.5	371.9	1,489.4	1,258.1	231.3
1983	691.9	430.8	261.1	1,100.2	836.9	263.3
1984	734.9	446.0	289.0	1,652.7	1,316.5	336.1
1985	772.2	494.6	277.6	2,110.1	1,685.6	424.5
1986	908.1	564.9	343.2	2,682.9	2,015.3	667.6
1987	1,010.2	585.8	424.4	2,412.3	1,803.0	609.3
1988	1,219.8	685.1	534.7	2,419.8	1,844.2	575.6

Note: Machine tool export figures include used and rebuilt machine tools, machine tools designed for home workshops and laboratories, and some metalworking machinery other than machine tools. Some attachments and accessories are included prior to 1972.

Sources: U.S. Bureau of the Census, "EM 522" and "IM 146."

The coverage of exports reported by the Bureau of the Census in its report "EM 522" is more inclusive than that reported as "manufacturers' export shipments." The data include exports by distributors and brokers, rebuilt tools, machine tools designed for workshops, garages, etc. Values include freight, insurance, and other charges from the manufacturers' plants to the point of departure in the United States. Import values exclude import duties, insurance, ocean freight and other charges incidental to the arrival of goods in the United States.

U.S. FOREIGN TRADE IN BORING MACHINES
INCLUDING VERTICAL TURRET LATHES
1969 to Date
(Values in Millions of Dollars)

	Exports of Domestic Merchandise				Imports for Consumption	
	Total Exports		Manufacturers' Exports Shipments (a,b)			
Year	Units	Value at U.S. Port	Units	Value F.O.B. Factory	Units	Customs Import Value (c)
1969	363	$11.7	121	$ 6.2	797	$ 21.0
1970	503	18.6	158	8.1	2,223	22.8
1971	419	11.5	139	3.8	808	11.6
1972	392	11.2	71	3.0	1,083	13.6
1973	427	10.2	NA	3.7	825	14.4
1974	328	14.1	NA	12.0	1,726	28.8
1975	566	19.7	NA	8.1	2,521	41.1
1976	393	16.3	NA	9.8E	3,219	41.0
1977	382	20.3	NA	6.5	4,824	51.7
1978	577	21.7	NA	10.2	1,347	65.9
1979	724	32.4	NA	9.5	1,901	70.7
1980	626	33.2	NA	17.7	2,289	76.9
1981	797	79.4	NA	41.5E	3,158	86.7
1982	303	32.4	NA	14.9	3,140	78.8
1983	193	18.5	NA	D	1,327	44.6
1984	266	17.6	NA	3.5	844	49.7
1985	247	23.3	NA	3.4	972	50.4
1986	559	46.2	NA	D	1,240	119.6
1987	346	25.6	NA	D	1,020	82.0
1988	331	23.4	NA	D	838	49.0

NA - Not Available. E - Estimate by NMTBA. D - Withheld to avoid disclosure.

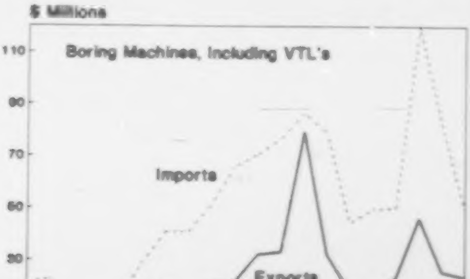
(a) Complete new machines as shipped including accessories, etc., ordered and shipped with the machines; excludes home workshop tools, etc.

(b) Manufacturers' export shipments exclude vertical turret lathes.

(c) Generally represents a value in the foreign country and therefore excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the machines to the United States.

Sources: Manufacturers' export shipments; U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries). All other data; U.S. Bureau of the Census, "EM 522" and "IM 146."

The user should be aware that the minimum valuation of machines included in each of the three series shown on this and following tables has changed over time. "Total Exports" included all machines, regardless of value, until 1973. From 1974 through 1977 the series included only machines above $1,000. The minimum value was increased in 1978 to $2,500. "Manufacturers' Export Shipments" include machines valued less than $1,000 for all years shown. "Imports for Consumption" included all machines regardless of value through 1977. After 1977 only machines valued over $2,500 are included.



U.S. FOREIGN TRADE IN DRILLING MACHINES

1969 to Date

(Values in Millions of Dollars)

	Exports of Domestic Merchandise				Imports for Consumption	
	Total Exports		Manufacturers' Export Shipments (a)			
Year	Units	Value at U.S. Port	Units	Value F.O.B. Factory	Units	Customs Import Value (b)
1969	2,413	$ 9.5	1,153	$ 5.6	6,146	$ 6.0
1970	2,316	9.5	1,353	5.5	5,690	4.3
1971	2,173	8.5	672	5.0	4,744	2.9
1972	1,788	9.5	587	4.4	8,223	4.3
1973	2,889	12.6	NA	6.0E	8,541	.6
1974	883	12.9	NA	6.2	11,928	8.8
1975	860	13.9	NA	9.3	11,754	9.4
1976	815	13.6	NA	7.8	50,147(c)	15.3(c)
1977	782	14.6	NA	4.2	72,534(d)	19.7(d)
1978	688	13.8	NA	4.1	1,714	18.7
1979	1,762	16.8	NA	4.2	2,515	25.0
1980	546	22.2	NA	12.2	2,253	27.2
1981	566	24.4	NA	12.1	2,238	26.4
1982	349	12.4	NA	3.4	1,317	20.7
1983	233	8.3	NA	5.1	585	9.9
1984	222	10.3	NA	1.2	916	17.9
1985	197	6.9	NA	3.0	1,314	32.6
1986	280	15.4	NA	.7	1,266	39.1
1987(r)	324	10.5	NA	.8	1,211	29.1
1988(p)	301	11.2	NA	3.8(e)	1,323	33.5

NA - Not Available. E - Estimate by NMTBA. p - Preliminary. r - Revised.

(a) Complete new machines as shipped including accessories, etc., ordered and shipped with the machines; excludes home workshop tools, etc.

(b) Generally represents a value in the foreign country, and therefore excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the machines to the United States.

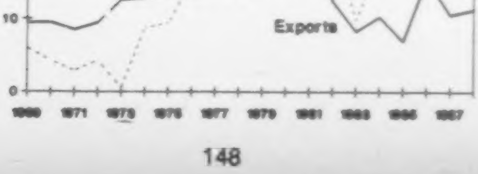
(c) Estimated imports from Taiwan and Japan evidently include bench type, home workshop and possibly portable machines which are not by traditional definition machine tools. Estimates by NMTBA indicate actual units may have been as low as 6,000 and dollar value about $12,000.

(d) The average unit value of imports from Norway, India, Japan and Taiwan, as reported by the U.S. Bureau of the Census, was extremely low. Evidently these imports include machines which are not by traditional definition machine tools.

(e) Includes Boring Machines.

Note: See note on page 147 concerning description of categories.

Sources: Manufacturers' export shipments; U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metal working Machinery" (Quarterly and Annual Summaries). All other data; U.S. Bureau of the Census, "EM 522" and "IM 146."



U.S. FOREIGN TRADE IN GEAR CUTTING AND FINISHING MACHINES

1969 to Date

(Values in Millions of Dollars)

	Exports of Domestic Merchandise				Imports for Consumption	
	Total Exports		Manufacturers' Export Shipments (a)			
Year	Units	Value at U.S. Port	Units	Value F.O.B. Factory	Units	Customs Import Value (b)
1969	841	$24.4	615	$32.2	320	$ 2.5
1970	780	28.4	636	40.0	226	4.5
1971	1,030	30.0	588	36.4	132	3.7
1972	900	30.0	439	30.7	250	4.5
1973	718	27.5	NA	29.0E	134	4.7
1974	546	29.1	NA	40.0E	343	10.7
1975	499	31.4	NA	35.9	365	20.7
1976	552	25.7	NA	19.7E	198	16.9
1977	303	28.1	NA	D	200	13.5
1978	1,069(c)	47.0(c)	NA	D	494(d)	25.9(d)
1979	684(e)	43.8(e)	NA	D	466	33.1
1980	519(e)	61.2(e)	NA	D	415	41.3
1981	698(e)	80.1(e)	NA	D	367	37.0
1982	369(e)	37.4(e)	NA	D	281	25.8
1983	65	11.8	NA	D	153	13.8
1984	84	17.3	NA	D	328	18.1
1985	105	20.4	NA	D	301	20.5
1986	235	35.6	NA	D	557	32.6
1987	198	41.5	NA	D	509	50.0
1988	236	34.5	NA	D	658	41.8

NA - Not Available. E - Estimate. D - Withheld to avoid disclosure.

(a) Complete new machines as shipped including accessories, etc., ordered and shipped with the machines; excludes home workshop tools, etc.

(b) Generally represents a value in the foreign country, and therefore excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the machines to the United States.

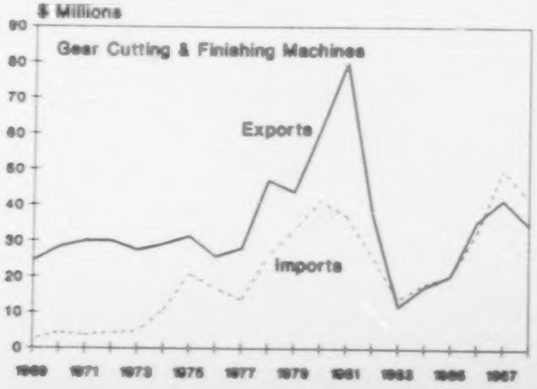
(c) Includes machines valued at less than $2,500.

(d) Includes used, rebuilt and machines valued less than $2,500 each.

(e) Data for years 1979 to 1982 may be inaccurate due to a reporting error by exporters.

Note: See note page 147 concerning description of categories.

Sources: Manufacturers export shipments; U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries). All other data; U.S. Bureau of the Census, "EM 522" and "IM 146."



U.S. FOREIGN TRADE IN GRINDING AND POLISHING MACHINES

1969 to Date

(Values in Millions of Dollars)

	Exports of Domestic Merchandise				Imports for Consumption	
	Total Exports		Manufacturers' Export Shipments (a)			
Year	Units	Value at U.S. Port	Units	Value F.O.B. Factory	Units	Customs Import Value (b)
1969	7,906	$41.5	3,396	$37.0	5,352	$16.6
1970	9,154	48.4	4,190	47.0	5,425	15.3
1971	8,094	32.7	3,677	29.4	3,175	11.6
1972	8,900	30.2	3,591	26.8	4,791	12.7
1973	9,883	50.5	NA	39.4	3,972	20.0
1974	3,266	53.0	NA	53.5	7,500	32.4
1975	3,022	53.0	NA	49.5	5,641	34.1
1976	2,537	57.3	NA	56.3	35,411(c)	32.2(c)
1977	4,124	40.1	NA	38.3	46,573(d)	39.2(d)
1978	2,455	80.8	NA	49.8	3,261	68.1
1979	2,487	65.9	NA	42.0	4,233	80.5
1980	1,979	85.1	NA	75.4	5,698	138.6
1981	2,694	126.5	NA	88.2	5,334	137.2
1982	1,877	71.1	NA	69.3	4,530	117.6
1983	930	49.0	NA	54.2	3,282	89.6
1984	999	46.7	NA	34.1	5,249	118.5
1985	1,365	56.6	NA	36.8	6,746	147.9
1986	1,164	60.4	NA	45.4	6,611	190.0
1987(r)	1,901	103.7	NA	59.4	5,885	177.6
1988(p)	2,606	125.6	NA	68.0	6,565	194.7

NA - Not Available. p - Preliminary. r - Revised.

(a) Complete new machines as shipped including accessories, etc., ordered and shipped with the machines; excludes home workshop tools, etc.

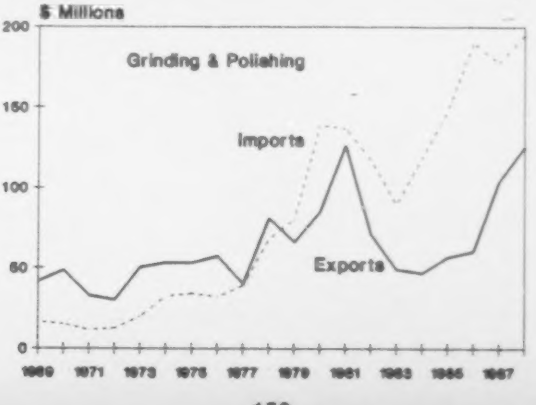
(b) Generally represents a value in the foreign country, and therefore excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the machines to the United States.

(c) Estimated imports from Taiwan and Japan evidently include bench type, home workshop and possibly portable machines which are not by traditional definition machine tools. Estimates by NMTBA indicate actual units may have been as low as 11,500 and the dollar value about $31,000.

(d) The average unit value of imports from Taiwan, as reported by the U.S. Bureau of the Census was extremely low. Evidently these imports include machines which are not by traditional definition machine tools.

Note: See note on page 147 concerning description of categories.

Sources: Manufacturers' export shipments; U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual summaries). All other data; U.S. Bureau of the Census, "EM 522" and "IM 146."



U.S. FOREIGN TRADE IN LATHES, EXCLUDING VERTICAL TURRET LATHES

1969 to Date

(Values in Millions of Dollars)

	Exports of Domestic Merchandise				Imports for Consumption	
	Total Exports		Manufacturers' Export Shipments (a,b)			
Year	Units	Value at U.S. Port	Units	Value F.O.B. Factory	Units	Customs Import Value (c)
1969	2,213	$22.2	673	$16.8	13,241	$ 38.0
1970	2,871	29.2	842	29.3	12,082	27.9
1971	2,481	26.8	774	24.0	6,252	17.8
1972	2,957	21.1	500	19.2	5,578	22.9
1973	3,124	24.3	NA	20.3E	6,058	45.7
1974	1,921	31.0	NA	31.9E	8,187	73.1
1975	2,503	43.6	NA	55.0	6,745	77.0
1976	2,153	47.4	NA	45.9	7,801	77.0
1977	1,953	42.3	NA	35.6	11,527	113.0
1978	1,434	43.7	NA	37.1	12,280	219.3
1979	1,717	53.0	NA	45.5(d)	18,332	353.6
1980	1,107	67.1	NA	50.8(d)	16,710	380.0
1981	1,468	90.0	NA	58.5(d)	15,445	479.8
1982	957	70.4	NA	36.8	11,141	338.6
1983	687	34.9	NA	9.9(e)	6,662	165.7
1984	904	39.4	NA	15.7(d)	9,019	268.1
1985	1,030	52.0	NA	25.1(d)	11,938	350.3
1986	1,929	59.0	NA	26.0(d)	11,767	391.1
1987	1,032	51.7	NA	32.8(d)	8,457	331.5
1988	1,010	59.8	NA	24.6(d)	9,429	396.9

NA-Not Available. E-Estimate by NMTBA.

(a) Complete new machines as shipped including accessories, etc., ordered and shipped with the machines; excludes home workshop tools, etc.

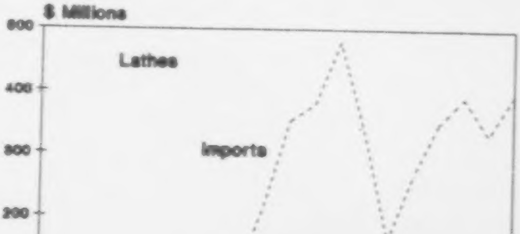
(b) Manufacturers' export shipments include vertical turret lathes.

(c) Generally represents a value in the foreign country, and therefore excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the machines to the United States.

(d) Does not include data for Vertical NC Lathes.

Note: See note on page 147 concerning description of categories.

Sources: Manufacturers' export shipments: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries). All other data: U.S. Bureau of the Census, "EM 522" and "IM 146."



U.S. FOREIGN TRADE IN MILLING MACHINES
1969 to Date
(Values in Millions of Dollars)

	Exports of Domestic Merchandise				Imports for Consumption	
	Total Exports		Manufacturers' Export Shipments (a)			
Year	Units	Value at U.S. Port	Units	Value F.O.B. Factory	Units	Customs Import Value (b)
1969	686	$13.6	368	$ 6.7	4,710	$26.3
1970	779	19.1	456	12.2	2,047	13.4
1971	681	17.6	276	11.8	986	7.9
1972	589	13.6	416	5.3	1,441	7.5
1973	687	14.0	NA	8.0E	1,760	12.4
1974	776	14.8	NA	10.3	2,313	19.8
1975	804	20.6	NA	20.6	2,567	23.3
1976	799	14.4	NA	16.3E	2,413	25.9
1977	965	21.3	NA	D	3,720	27.9
1978	1,026	30.6	NA	D	3,364	47.7
1979	1.040	23.4	NA	20.1	6.650	83.1
1980	360	19.2	NA	27.9	11,573	138.1
1981	292	37.8	NA	33.4	10,434	124.7
1982	331	22.4	NA	21.0	5,985	87.7
1983	187	13.9	NA	9.0	3,660	52.5
1984	209	22.7	NA	16.1	6,471	83.4
1985	333	19.3	NA	26.8	7,736	133.7
1986	227	25.2	NA	15.3	6,551	113.8
1987(r)	330	24.7	NA	22.3	4,766	87.4
1988(p)	303	28.2	NA	16.7	6,217	103.1

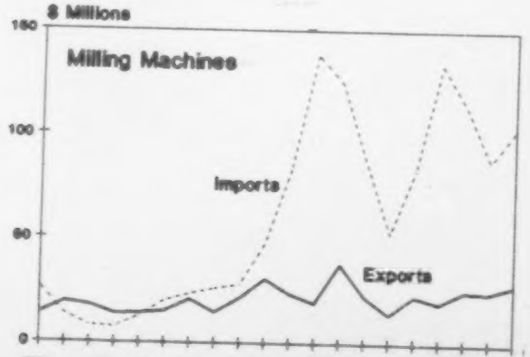
NA - Not Available. D - Withheld to avoid disclosure. E - Estimate by NMTBA. p - Preliminary. r - Revised.

(a) Complete new machines as shipped including accessories, etc., ordered and shipped with the machines; excludes home workshop tools, etc.

(b) Generally represents a value in the foreign country, and therefore excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the machines to the United States.

Note: See note on page 147 concerning description of categories.

Sources: Manufacturers' export shipments: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries). All other data: U.S. Bureau of the Census, "EM 522" and "IM 146."



U.S. FOREIGN TRADE IN MACHINING CENTERS

1979 to Date

(Values in Millions of Dollars)

	Exports of Domestic Merchandise				Imports for Consumption	
	Total Exports		Manufacturers' Export Shipments (a)			
Year	Units	Value at U.S. Port	Units	Value F.O.B. Factory	Units	Customs Import Value (b)
1979(c)	259	$45.4	NA	D	552	$ 39.6
1980	313	56.7	NA	$57.9	957	93.4
1981	316	53.4	NA	43.0	2,007	195.7
1982	195	34.0	NA	D	1,873	188.9
1983	102	13.3	NA	D	1,936	164.9
1984	117	18.6	NA	10.2	2,911	248.0
1985	156	21.0	NA	D	4,188	330.0
1986	131	20.5	NA	17.5	4,037	361.8
1987(r)	202	20.6	NA	23.8	2,914	313.4
1988(p)	283	30.8	NA	31.2	2,919	326.3

NA - Not Available. D - Withheld to avoid disclosure. p - Preliminary. r - Revised.

(a) Complete new machines as shipped including accessories, etc., ordered and shipped with the machines; excludes home workshop tools, etc.

(b) Generally represents a value in the foreign country, and therefore excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the machines to the United States.

(c) Data not available prior to 1979, Machining Centers had been included in "Other" category.

Sources: Manufacturers' export shipments; U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries). All other data; U.S. Bureau of the Census, "EM 522" and "IM 146."

U.S. FOREIGN TRADE IN "OTHER" METAL CUTTING MACHINE TOOLS(c,d)

1969 to Date

(Values in Millions of Dollars)

	Exports of Domestic Merchandise				Imports for Consumption	
	Total Exports		Manufacturers' Export Shipments (a)			
Year	Units	Value at U.S. Port	Units	Value F.O.B. Factory	Units	Customs Import Value (b)
1969	9,869	$ 29.5	3,080	$ 30.7	10,832	$ 22.4
1970	11,777	53.0	3,464	43.7	18,509	16.4
1971	10,550	21.9	2,728	22.8	20,167	15.5
1972	9,201	21.8	3,073	23.2	20,704	17.1
1973	14,554	55.5	NA	63.8	9,251	23.3
1974	27,309	90.6	NA	78.0	26,444	35.5
1975	52,902	145.7	NA	146.7	21,266	42.5
1976	98,545	99.1	NA	90.7	42,064	37.1
1977	91,551	80.6	NA	66.4	74,175	53.3
1978	107,823	115.5	NA	92.0	465,218	136.5
1979	105,962	111.7	NA	74.0	597,946	147.5
1980	53,943	150.6	NA	173.2	582,050	169.7
1981	70,191	232.1	NA	168.7	901,398	204.5
1982	48,525	123.4	NA	49.2(e)	1,174,244	199.2
1983	38,895	108.4	NA	23.2(e)	1,753,390	175.7
1984	40,538	77.6	NA	12.8(e)	1,331,381	252.8
1985	32,917	86.3	NA	17.0(e)	1,035,677	309.3
1986	40,473	109.0	NA	10.3(e)	872,862	406.5
1987(r)	35,222	105.4	NA	30.5(e)	1,099,238	364.7
1988(p)	38,614	129.9	NA	23.7(e)	1,049,377	397.9

NA - Not Available. p - Preliminary. r - Revised.

(a) Complete new machines as shipped including accessories, etc., ordered and shipped with the machines; excludes home workshop tools, etc.

(b) Generally represents a value in the foreign country, and therefore excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the machines to the United States.

(c) For 1978 and prior years Machining Centers were included in "Other." After 1979 Machining Centers are classified separately.

(d) Beginning in 1980 "Used and Rebuilt" machine tools are included in Total Exports and Imports.

(e) Does not include data for Station Type Machines.

Note: See note on page 147 concerning description of categories.

Sources: Manufacturers' export shipments; U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries). All other data; U.S. Bureau of the Census, "EM 522" and "IM 146."

U.S. FOREIGN TRADE IN METAL FORMING MACHINES AND PARTS

1969 to Date

(Millions of Dollars)

	Exports of Domestic Merchandise (Value at U.S. Port)								Imports for Consumption
Year	Total	Presses	Bending and Forming	Punching and Shearing	Forging Machines	Other New(b)	Used	Parts	Customs Import Value (a)
1969	$122.4	$28.3	$14.1	$ 9.5	$ 6.9	$ 31.2	$ 4.4	$ 28.0	$ 29.2
1970	135.1	25.9	11.0	6.5	8.3	34.2	6.1	43.1	32.4
1971	140.3	29.0	12.9	5.6	12.0	38.2	7.0	35.7	22.2
1972	145.4	34.0	11.9	5.9	11.2	37.6	11.0	33.7	37.6
1973	194.3	41.7	16.3	5.0	13.7	54.2	14.1	49.2	47.0
1974	245.7	58.6	21.3	9.4	10.8	64.9	14.5	66.3	69.0
1975	288.6	66.0	22.9	13.8	12.5	93.5	15.8	64.1	79.4
1976	320.0	80.1	26.0	20.2	13.5	101.3	15.6	63.3	89.7
1977	258.1	46.6	25.6	15.4	13.4	78.5	14.9	63.7	95.5
1978	284.9	32.3	39.2	13.7	21.0	73.9	13.6	91.2	150.7
1979	333.7	51.8	45.7	22.3	7.0	99.8	14.2	92.9	241.9
1980	424.6	69.7	44.5	44.8	16.4	95.9	18.6	134.7	274.7
1981	471.4	79.4	46.0	44.9	21.3	89.3	22.6	167.8	227.8
1982	371.9	53.8	35.1	32.9	15.3	61.7	12.5	160.5	231.3
1983	261.1	30.0	19.7	18.1	7.9	52.8	19.2	113.4	263.3
1984	289.0	36.0	19.4	22.6	11.8	60.1	9.1	129.9	336.1
1985	277.5	~~41.7~~	30.3	18.1	12.2	55.6	8.5	111.1	424.5
1986	343.2	63.4	33.9	21.8	19.7	72.6	7.6	124.1	667.6
1987	424.4	71.0	33.3	22.5	23.9	96.9	19.1	157.5	609.3
1988	534.7	89.2	49.1	48.3	27.1	94.2	16.7	210.1	575.6

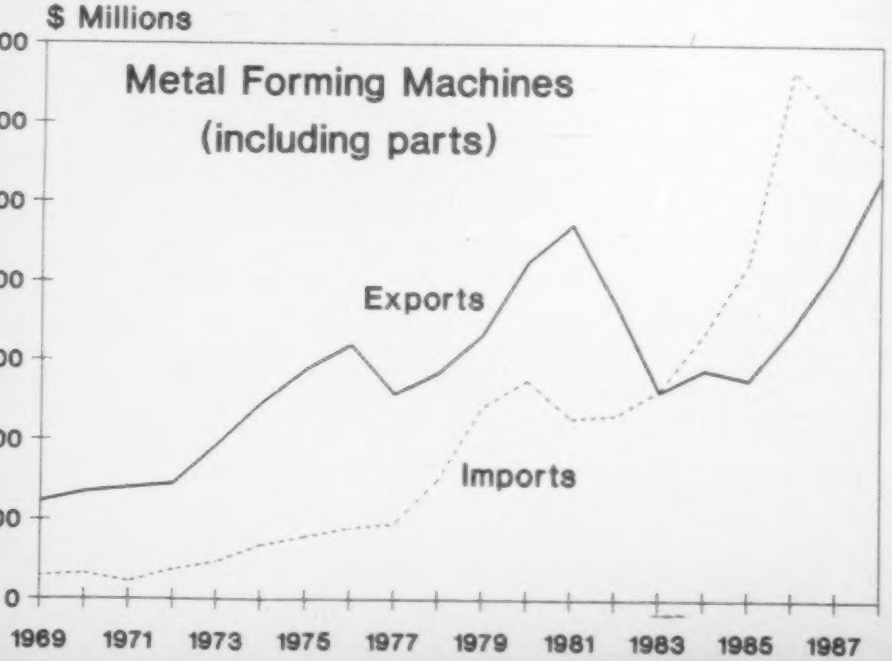
(a) Generally represents a value in the foreign country, and therefore excludes U.S. import duties, freight, insurance, and other charges incurred in bringing the machines to the United States.

(b) Beginning in 1980 "Die Casting Machines" are included.

Individual items may not add to total due to rounding.

Note: See note on page 147 concerning description of categories.

Source: U.S. Bureau of the Census, "EM 522" and "IM 146."



U.S. MANUFACTURERS' EXPORT SHIPMENTS OF METAL FORMING MACHINE TOOLS (a)

1959 to Date

(Values in Millions of Dollars)

	Total		Presses		Bending and Forming		Punching and Shearing		Forging		Other (b)	
Year	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
1959	2,166	$ 31.3	714	$15.1	793	$ 4.1	226	$ 3.0	96	$ 5.3	337	$ 3.8
1960	2,716	47.3	893	23.3	913	5.6	307	5.1	173	9.0	430	4.2
1961	2,756	55.2	934	30.7	930	4.7	283	6.8	166	8.9	445	4.1
1962	3,026	59.6	1,032	32.7	971	5.4	322	5.5	203	10.9	498	5.1
1963	2,965	42.3	943	20.1	1,135	7.6	362	6.5	112	4.7	403	3.4
1964	3,533	47.2	1,006	21.3	1,609	7.3	314	5.0	152	8.4	452	5.2
1965	3,338	44.1	751	18.4	1,600	5.6	284	4.3	148	8.4	565	7.5
1966	3,029	46.5	840	17.9	1,421	9.4	322	3.2	103	6.6	523	9.5
1967	2,824	50.2	962	24.5	933	5.6	324	5.9	98	6.3	507	7.9
1968	3,050	46.9	872	23.7	1,382	5.7	316	4.9	111	5.4	389	7.2
1969	3,380	39.9	943	14.3	1,503	5.1	536	6.5	141	6.1	257	7.9
1970	3,574	47.0	1,047	17.4	1,539	5.5	560	5.1	161	11.2	287	7.7
1971	4,491	51.9	915	22.3	1,287	5.7	461	3.7	186	13.0	1,642	7.1
1972	3,068	50.2	838	18.8	1,382	5.8	401	3.8	152	14.5	315	7.3
1973	NA	54.5	NA	21.2	NA	6.2	NA	3.4	NA	13.2	NA	10.5
1974	NA	78.4	NA	D	NA	15.7	NA	8.3	NA	D	NA	18.6
1975	NA	98.6	NA	D	NA	14.9	NA	14.7	NA	D	NA	16.8
1976	NA	105.8	NA	D	NA	16.5	NA	17.4	NA	D	NA	16.8
1977	NA	71.7	NA	D	NA	13.5	NA	16.6	NA	D	NA	12.9
1978	NA	112.8	NA	D	NA	17.4	NA	14.7	NA	D	NA	18.7
1979	NA	112.0	NA	27.7	NA	24.5	NA	16.8	NA	D	NA	D
1980	NA	152.0	NA	35.2	NA	34.5	NA	32.6	NA	D	NA	D
1981	NA	156.7	NA	43.1	NA	29.8	NA	29.5	NA	D	NA	D
1982	NA	118.4	NA	36.6	NA	19.6	NA	16.2	NA	D	NA	D
1983	NA	54.3	NA	13.6	NA	13.9	NA	9.8	NA	D	NA	D
1984	NA	62.7	NA	15.2	NA	14.4	NA	6.8	NA	D	NA	D
1985	NA	77.6	NA	15.4	NA	15.8	NA	20.5	NA	8.5	NA	17.4
1986	NA	63.4	NA	11.9	NA	22.0	NA	11.5	NA	5.3	NA	12.6
1987(r)	NA	104.8	NA	20.3	NA	27.6	NA	17.0	NA	13.5E	NA	26.4E
1988(p)	NA	131.3	NA	32.1	NA	30.1	NA	24.3	NA	D	NA	44.8

NA - Not Available. D - Withheld to avoid disclosure. p - Preliminary. r - Revised. E - Estimate by NMTBA.

(a) Complete new machines as shipped, including accessories, etc., ordered and shipped with the machines, f.o.b. factory.

(b) Some metalworking machines, other than metal forming type machines, are included prior to 1968.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

The export figures for machine tools shown in this table and in tables and graphs in Chapter 4 are substantially lower than those on the preceding pages. This is so for several reasons: first, the data for Manufacturers' Exports cover only new and complete machine tools; second, they represent the manufacturer's selling price at the factory (F.O.B.); third, they exclude machine tools which are sold domestically but exported later by the buyer.

U.S. MANUFACTURERS' EXPORT SHIPMENTS OF NEW MACHINE TOOLS (a)

Units and Value, 1959 to Date

(Values in Millions of Dollars)

Year	Total (b)		Metal Cutting		Metal Forming (b)	
	Units	Value	Units	Value	Units	Value
1959	9,867	$ 80.8	7,701	$ 49.5	2,166	$ 31.3
1960	13,203	$157.5	10,487	$110.2	2,716	$ 47.3
1961	14,080	207.2	11,322	152.0	2,758	55.2
1962	14,520	216.1	11,494	156.5	3,026	59.6
1963	15,109	144.4	12,154	102.1	2,955	42.3
1964	14,110	198.6	10,577	151.4	3,533	47.2
1965	12,475	171.3	9,137	127.1	3,338	44.1
1966	14,634	173.2	11,425	126.7	3,209	46.5
1967	12,861	194.1	10,037	143.9	2,824	50.2
1968	11,462	174.5	8,109	121.2	3,353	53.3
1969	13,083	181.5	9,406	135.2	3,677	46.3
1970	15,061	238.8	11,099	185.8	3,962	52.9
1971	13,634	191.0	8,854	133.2	4,780	57.7
1972	12,093	171.1	8,677	112.6	3,416	58.5
1973	NA	224.7	NA	170.2	NA	54.5
1974	NA	310.2	NA	231.8	NA	78.4
1975	NA	423.6	NA	325.0	NA	98.6
1976	NA	352.3	NA	246.5	NA	105.8
1977	NA	279.1	NA	207.5	NA	71.7
1978	NA	371.0	NA	258.2	NA	112.8
1979	NA	395.6	NA	283.5	NA	112.0
1980	NA	630.8	NA	482.3	NA	148.5
1981	NA	675.0	NA	518.3	NA	156.7
1982	NA	427.5	NA	309.1	NA	118.4
1983	NA	212.3	NA	158.0	NA	54.3
1984	NA	178.7	NA	115.9	NA	62.7
1985	NA	280.6	NA	203.0	NA	77.6
1986	NA	259.3	NA	196.0	NA	63.4
1987(r)	NA	327.6	NA	222.8	NA	104.8
1988(p)	NA	330.0	NA	198.7	NA	131.3

NA - Not Available. p - Preliminary. r - Revised. E - Estimate by NMTBA.

(a) Complete machines as shipped, including accessories, etc., ordered and shipped with the machinery at manufacturers' selling price, f.o.b. factory. Excludes rebuilt machines, machines designed primarily for home workshops, laboratories, garages, etc., and parts.

(b) Includes some metalworking type machines other than machine tools prior to 1973.

Note: See note on page 156.

Source: U.S. Department of Commerce, "Current Industrial Reports, Series MQ-35W, Metalworking Machinery" (Quarterly and Annual Summaries).

U.S. MANUFACTURERS' EXPORT SHIPMENTS OF METAL CUTTING MACHINE TOOLS

1980 to DATE

(Values in Millions of Dollars)

Machine Classification	1980	1981	1982	1983	1984	1985	1986	1987	1988
METAL CUTTING MACHINE TOOLS	$482.3	$518.3	$309.1	$158.0	$115.9	$203.0	$196.0	$222.8	$198.7
Boring Machines	17.7	D	14.9	D	3.5	3.4	D	D	3.8
Drilling Machines	12.2	12.1	3.4	5.1	1.2	3.0	.7	.8	
Valued at $2,500	.2	.2	D	D	D	D	D	D	
All other Drilling Machines	12.0	12.0	D	D	D	D	D	D	
Gear Cutting Machines	D	D	D	D	D	D	D	D	D
Grinding, Polishing, Buffing									
Honing & Lapping Machines	75.4	88.2	69.3	54.2	34.1	36.8	45.5	59.4	68.0
Valued at under $2,500	.6	.6	.4	.4	.7	.6	9.6	.7	.8
External Cylindrical Grinding									
Plain (incl. angular wheel type) & Universal	D	10.4	10.3	D	10.6	6.3		11.9	11.7
Roll, Centerless, & Chuck type grinder	D	30.4	26.4	21.5					
All other grinding machines	D								
Internal Cylindrical Grinding Surface Grinding Machines:									
Rotary & Reciprocating table type	10.3	10.3	9.2	D	17.9	7.4	11.6	34.1	31.4
All other Surface Grinders	2.0	36.5	5.3	2.7					
All other Grinding Machines	15.3			5.0		16.3	16.4		
Honing & Lapping Machines	18.3		17.6	14.9	5.0	6.1	7.8	12.7	10.8
Polishing & Buffing Machines									
Horizontal NC Turning Machines	21.6	21.2	17.2	D	10.8	14.1	12.7	18.6	17.0
Vertical NC Turning Machines	D	D	2.5	D	0	D	D	D	D
Non-NC Turning Machines	29.2	37.3	17.1	9.9	5.0	11.0	13.3	14.1	7.6
Valued under $2,500	1.5	D	D	D					
Engine or Tool Room lathes, swing over cross slide	D	3.1	2.2	D					
Turret lathes, horizontal	D	6.4							
Automatic lathes			D	D					
Single spindle	D								
Multiple spindle	14.7	26.3	D	D					
All other Horizontal lathes	D	D	4.6	D					
All other Vertical lathes									
Milling Machines	27.9	33.4	21.0	9.0	16.1	26.8	15.3	22.3	16.7
Machining Centers	57.9	43.0	D	D	10.2	D	17.5	23.8	31.2
Drill, Mill, Bore, manual tool change	D	D	D	D	D	D	D	D	D
Drill, Mill, Bore, (ATC) Vertical	18.4	15.0	D	D	4.5	5.0	5.1	9.0	9.1
Horizontal	36.2	24.4	19.3	D	D	12.4	D	D	D
All other Machining Centers	D	D	D	D	0	D	0	D	D
Station Type Machines	133.9	111.0	D	D	D	D	D	D	D
Other Metal Cutting Machines	39.3	57.8	49.2	23.2	12.8	17.0	10.3	30.5	23.7

D - Withheld to avoid disclosure.

Source: U.S. Department of Commerce, Current Industrial Reports, MQ-35W.

U.S. MANUFACTURERS' EXPORT SHIPMENTS OF METAL FORMING MACHINE TOOLS

1982 to DATE

(Values in Millions of Dollars)

Machine Classification	1982	1983	1984	1985	1986	1987(r)	1988(p)
METAL FORMING MACHINE TOOLS	$118.4	$54.3	$62.7	$77.6	$63.4	$104.8	$131.3
Punching, Shearing, Bending and Forming Machines	35.7	23.7	21.2	36.3	33.5	44.6	62.3
Punching & Shearing valued under $2,500	.3	.2	.3	.3	.3	.2	.2
Punches, incl. combination Punching & Shearing Machines	3.2	8.2	4.8				
Punching Machines fixed position and two axes positioning table	7.0			20.2	11.3	17.0	27.9
Plate Shearing Machines	5.7	1.3	1.7				
Other Punching & Shearing							
All Bending & Forming valued under $2,500	.7	.4	.4	.8	.7	1.0	1.0
Press Brakes	8.7			6.8			
Bending Rolls							
Rotary Bending & Forming Machines (incl. Rotary Head)		6.1	13.9		21.3	25.6	31.3
Ram & Press Bending Machines							
Other Bending & Forming	10.2	7.4		8.2			
Presses, except forgings	36.6	13.6	15.2	15.4	11.9	20.3	32.1
Presses valued under $2,500	.4	.3	D				
Mechanical Presses:							
Open Back Inclinable	D	D	D	7.0	9.8	D	D
Other Mechanical Presses	15.4	5.8	D				
Hydraulic Presses	D	D	D	8.4	2.1	D	D
Forging Machines	D	D	D	8.5	5.3	13.5E	D
Other Metal Forming Machines	D	D	D	17.4	12.6	D	44.8
Thread Rolling	D	D	D	7.3	1.1		
Metal Container Making Machinery	10.3(a)	7.5(a)	6.6(a)		4.7	D	
Die Casting	D	D	D	0	0		
Riveting Machines	D	D	D	0	6.7		
Other Metal Forming Machines	7.7	4.4	8.3	10.0			

E - Estimate by NMTBA. D - Withheld to avoid disclosure. r - Revised. p - Preliminary.

(a) "Metal Container Making Machinery" was included with "Other Metal Forming Machines" prior to 1982.

Source: U.S. Commerce Department, Current Industrial Reports, MQ35W.

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6

WORLD MACHINE TOOL INDUSTRY

As is the case with many other manufactured products, the machine tool market has rapidly become internationalized over the course of the past fifteen years. During the 1960's the majority of the world's machine tools came from the U.S. and western Europe. This is no longer the case, as Japan has become a formidable global competitor and many developing nations are developing their domestic machine tool industries. In order to accurately reflect the state of the machine tool industry and market in the U.S., it is therefore useful to put it into a global context. The statistics in this chapter are intended to do this. Using a wide variety of information, obtained primarily from foreign governments and trade associations, this chapter contains a comprehensive review of worldwide machine tool production, exports and imports.

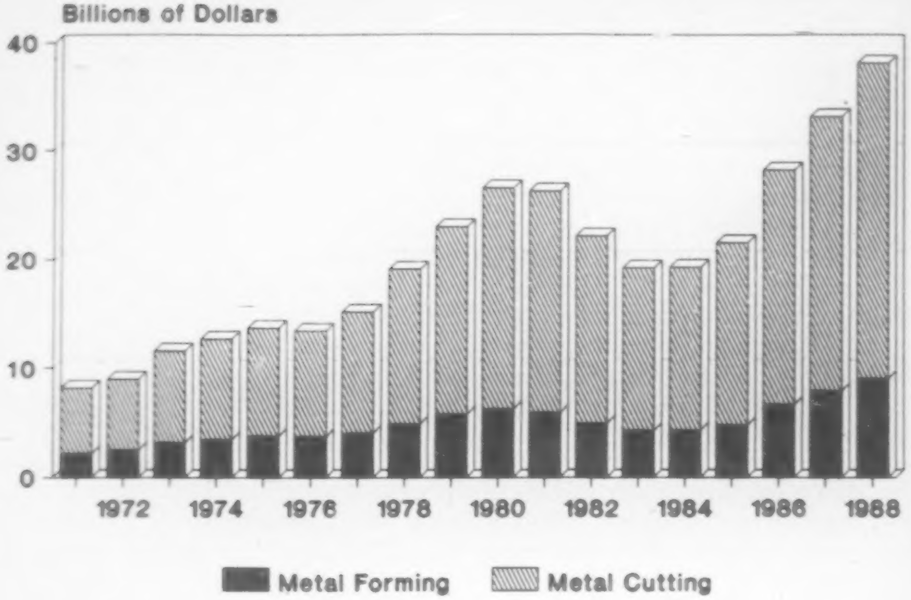
For many years American Machinist magazine has published estimates of world machine tool production and trade. These estimates, which cover 35 countries, came from unofficial sources and were revised for previous years when "official" figures become available. Whenever possible, this data includes only complete machine tools and excludes parts and attachments. However, for some countries it is not clear if the totals include or exclude the value of parts.

Several years ago, the trade associations of 12 European countries (co-operating through a group called CECIMO), the United States, Japan, and India agreed to develop a uniform international statistical reporting system. Under this system, the production, exports and imports of the participating countries are reported for seven major groups of metal cutting machine tools and three major groups of metal forming machine tools. Data by machine type for 1986 are included in this chapter. The machine tool production of the 12 reporting countries totaled about $19.7 billion in 1986.

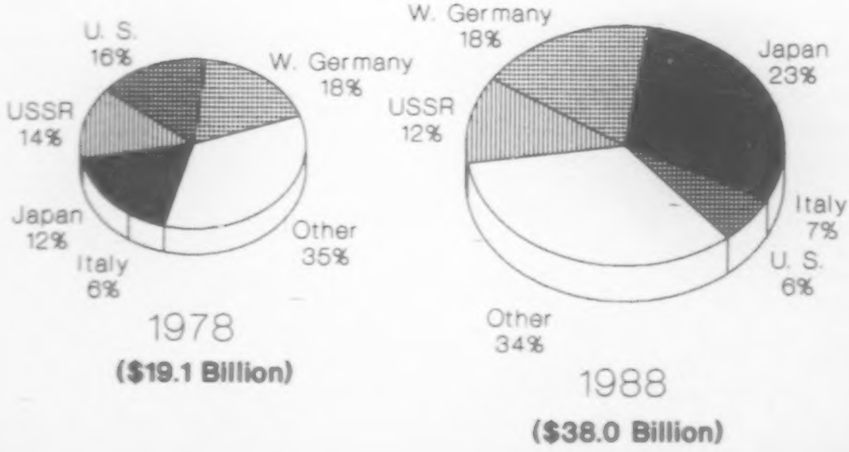
In the uniform international statistical reporting system for CECIMO, each participating country reports its data in Swiss Francs. In this chapter, these data have been converted into dollars with the conversion rates below the tables. These tables can be identified through the reference to "International Statistics on Machine Tools" as the source.

With the "floating" of many world currencies and the dramatic rise and decline of the value of the dollar in recent years, measuring the value of production and trade statistics has become increasingly confusing. Foreign data in this Handbook has been converted into dollars on the basis of trade conversion factors, as given in the International Monetary Fund's "International Financial Statistics." It may be necessary to convert dollar-denominated statistics back into national currency when one is attempting to analyse rates of change. The dollar-denominated figures may show declines (increases) at the same time when national currency figures reflect significant gains (declines).

World Machine Tool Production



Shares of World Machine Tool Output



WORLD MACHINE TOOL PRODUCTION, 1974 to Date

(Millions of U.S. Dollars) (a)

	Total	Metal Cutting	Metal Forming
1974	$12,656.3	$ 9,190.0	$3,466.3
1975	13,640.0	9,844.3	3,795.7
1976	13,387.4	9,672.5	3,714.9
1977	15,126.5	11,079.8	4,046.7
1978	19,088.4	14,192.8	4,889.4
1979	22,925.1	17,170.1	5,755.0
1980	26,501.3	20,268.4	6,232.8
1981	26,209.5	20,274.9	5,934.5
1982	22,071.3	17,171.4	4,957.0
1983	19,147.2	14,862.9	4,284.2
1984	19,250.6	14,912.1	4,338.5
1985	21,480.1	16,735.5	4,744.7
1986	28,154.7	21,549.5	6,605.1
1987(r)	33,081.5	25,183.3	7,898.2
1988(p)	38,407.4	29,009.4	9,038.2

p - Preliminary. r - Revised.

(a) Metal Cutting and Metal Forming may add to less than the total because a breakdown was not available for some countries.

Source: Penton Publishing Inc., "American Machinist"

LEADING MACHINE TOOL CONSUMING NATIONS

1988 and 1987

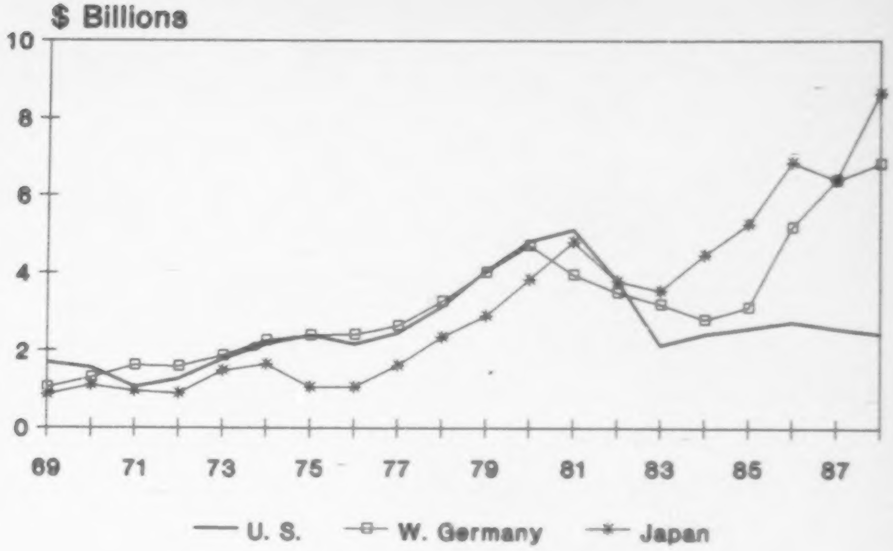
(Millions of U.S. Dollars)

Country	1988	1987
1. U.S.S.R.	$5,990.0	$5,303.2
2. Japan	5,686.8	3,649.1
3. United States	3,849.8	3,967.2
4. FGR (West Germany)	3,843.7	4,001.4
5. Italy	2,181.5	1,753.0
6. United Kingdom	1,420.4	1,087.1
7. France	1,376.6	1,220.2
8. PRC (China)	1,151.6	1,033.5
9. South Korea	1,109.1	979.5
10. Canada	944.7	708.4
11. Spain	726.8	606.9
12. Switzerland	690.2	576.7
13. Romania	621.4	619.4
14. Taiwan	589.9	412.7
15. Brazil	453.0	601.5
16. GDR (East Germany)	443.6	308.5
17. Poland	420.0	428.5
18. Sweden	414.4	377.3
19. Bulgaria	400.0	391.0
20. Yugoslavia	398.1	356.5
21. India	383.0	389.6
22. Mexico	255.5	267.4
23. Belgium	220.0	206.1
24. Netherlands	209.8	229.0
25. Australia	185.0	177.3
26. Israel	175.0	168.0
27. Czechoslovakia	170.0	160.0
28. Austria	161.0	159.0
29. Hungary	156.3	164.0
30. Denmark	129.2	133.8
31. Finland	114.1	120.9
32. South Africa	97.5	73.7

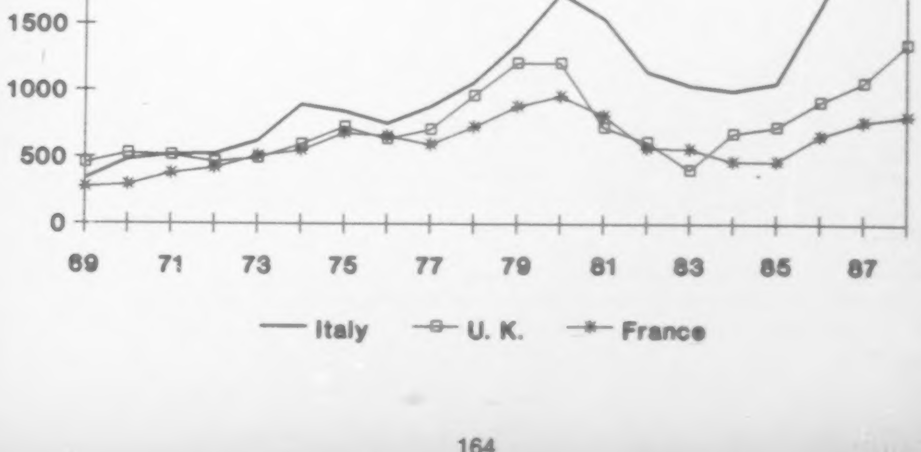
NOTE: Machine tool consumption is domestic production plus imports and minus exports.

Source: Penton Publishing Inc., "American Machinist," International Statistics on Machine Tools and NMTBA.

MACHINE TOOL SHIPMENTS
Selected Countries



MACHINE TOOL SHIPMENTS
Selected Countries



WORLD MACHINE TOOL PRODUCTION AND TRADE, 1988 (estimated)

(Millions of U.S. Dollars)

	Production			Trade	
	Total	Cutting	Forming	Export	Import
1. Japan	$ 8,643.3	$ 6,771.6	$1,871.7	$3,360.5	$ 404.0
2. FRG (West Germany)	6,833.3	4,863.0	1,970.3	4,128.5	1,138.9
3. Soviet Union*	4,500.0c	3,600.0c	900.0c	360.0c	1,850.0c
4. Italy	2,803.6	2,073.9	729.7	1,328.8	706.7
5. United States	2,440.0	1,565.0	875.0	602.2	2,012.0
6. Switzerland	1,913.6	1,667.6	246.0	1,626.6	403.2
7. GDR (East Germany)*	1,457.0	1,170.7	286.3	1,298.4	285.0
8. United Kingdom	1,349.3	1,183.4	166.0	666.7	737.8
9. France	805.8	639.7	166.1	335.7	906.5
10. PRC (China)*	731.6	532.1	199.5	130.0	550.0
11. Taiwan	695.2	533.7	161.6	421.6	316.3
12. Spain	673.6	510.6	163.0	249.7	302.9
13. Yugoslavia	671.7	498.3	173.3	445.5	171.9
14. Romania	657.5	575.0	82.5	163.0	126.9
15. South Korea	597.1	473.5	123.7	48.0	560.0
16. Czechoslovakia*	450.0c	400.0c	50.0c	375.0c	95.0c
17. Brazil	448.9	368.1	80.8	35.9	40.0
18. Poland*	320.0c	265.0c	55.0c	100.0c	200.0c
19. Canada	290.2	173.9	116.3	94.1	748.6
20. Sweden	280.9	173.0	107.9	211.8	345.3
21. India	272.0c	160.0c	112.0c	34.0c	145.0c
22. Hungary*	241.5	210.0	31.5	191.0	105.8
23. Belgium	190.0c	45.0c	145.0c	315.0c	345.0c
24. Austria	155.0c	120.0c	35.0c	169.0c	175.0c
25. Bulgaria*	150.0c	135.0c	15.0c	100.0c	350.0c
26. Israel	135.0c	100.0c	35.0c	115.0c	155.0c
27. Denmark	80.2	56.4	23.8	62.4	111.4
28. Australia	50.0c	20.0c	30.0c	5.0c	140.0c
29. Netherlands	45.5	30.3	15.2	179.5	343.8
30. Finland	42.7	6.3	35.4	39.9	111.3
31. Argentina	38.1	27.1	11.0	26.3	38.4
32. Singapore	37.0c	33.0c	4.0c	90.0c	150.0c
33. Portugal	19.2c	7.7c	11.5c	9.6c	34.0c
34. Mexico	18.0c	15.0c	3.0c	2.5c	240.0c
35. South Africa	9.7	5.3	4.4	0.2	88.0
36. Hong Kong	1.5c	0.2c	1.3c	6.5c	80.0c
Total	38,047.4	29,009.4	9,038.2	17,328.0	14,513.7

c - circa. Rough estimate from fragmentary data.

* - Countries with controlled currencies. The Soviet Union, Bulgaria, Czechoslovakia and Poland at 70% of the official rate; GDR at 65% of the FRG rate; Hungary, PRC (China), and Romania at IMF commercial rates.

Exchange Rates: All free-market currencies have been converted at rates in effect for the period covered. For 1988, conversion is based on IMF rates for the first nine months and bank-transfer rates for the last three months.

Notes: Whenever possible, data include complete machine tools only, excluding parts and attachments. Individual items may not add to totals due to rounding.

Source: Penton Publishing Inc., "American Machinist"

WORLD MACHINE TOOL PRODUCTION AND TRADE, 1987 (revised)

(Millions of U.S. Dollars)

	Production			Trade	
	Total	Cutting	Forming	Export	Import
1. Japan	$ 6,419.4	$ 4,762.2	$1,657.2	$ 3,035.1	$ 264.8
2. FRG (West Germany)	6,402.6	4,652.8	1,749.7	3,654.7	1,253.5
3. Soviet Union*	3,976.3c	3,234.0c	742.3c	312.3c	1,639.2c
4. United States	2,585.0	1,778.4	806.6	586.7	1,968.9
5. Italy	2,235.2	1,660.4	574.8	1,048.5	566.3
6. Switzerland	1,652.4	1,465.9	186.4	1,435.8	360.1
7. GDR (East Germany)*	1,312.0	1,054.2	257.8	1,202.4	198.9
8. United Kingdom	1,058.4	898.8	159.6	501.0	529.7
9. France	766.4	608.2	157.9	284.3	736.1
10. China, People's Rep.*	632.5	493.1	139.3	93.0	494.0
11. Romania*	617.8	551.9	65.9	132.9	134.5
12. Taiwan, ROC	577.8	482.6	95.2	379.9	214.8
13. Brazil	575.5	471.9	103.6	23.0	49.0
14. Spain	575.0	437.7	137.3	218.8	250.7
15. South Korea	530.9	393.5	137.4	37.5	486.1
16. Yugoslavia	515.0	382.1	132.9	303.4	145.0
17. Czechoslovakia*	405.0c	350.0c	45.0c	330.0c	85.0c
18. Poland	322.7c	266.0c	56.7c	98.1c	203.9c
19. India	277.7c	162.0c	115.7c	34.7c	146.6c
20. Sweden	257.7	158.5	99.2	192.7	312.3
21. Canada	244.1	143.6	100.5	63.7	528.0
22. Hungary	210.0	180.6	29.4	170.5	124.5
23. Belgium	179.3c	42.8c	136.5c	294.3c	321.1c
24. Austria	155.0c	120.0c	35.0c	169.7c	173.7c
25. Bulgaria*	140.0c	130.0c	10.0c	85.0c	336.0c
26. Israel	130.0c	95.0c	35.0c	115.0c	153.0c
27. Denmark	76.8	52.6	24.1	58.5	115.5
28. Netherlands	47.3	31.0	16.3	179.5	361.2
29. Australia	45.0c	17.0c	28.0c	4.9c	137.2c
30. Finland	35.3	5.2	30.1	29.3	114.9
31. Singapore	35.0c	32.0c	3.5c	85.0c	145.0c
32. Argentina	34.8	26.4	8.4	16.0	38.3
33. Mexico	21.4c	17.8c	3.6c	2.7c	248.7c
34. Portugal	18.7c	7.5c	11.2c	9.4c	33.0c
35. South Africa	12.3	7.4	4.9	2.5	63.9
36. Hong Kong	1.4c	0.2c	1.2c	6.0c	75.0c
Total	33,081.5	25,183.3	7,898.2	15,196.8	13,010.4

c - circa. Rough estimate from fragmentary data.

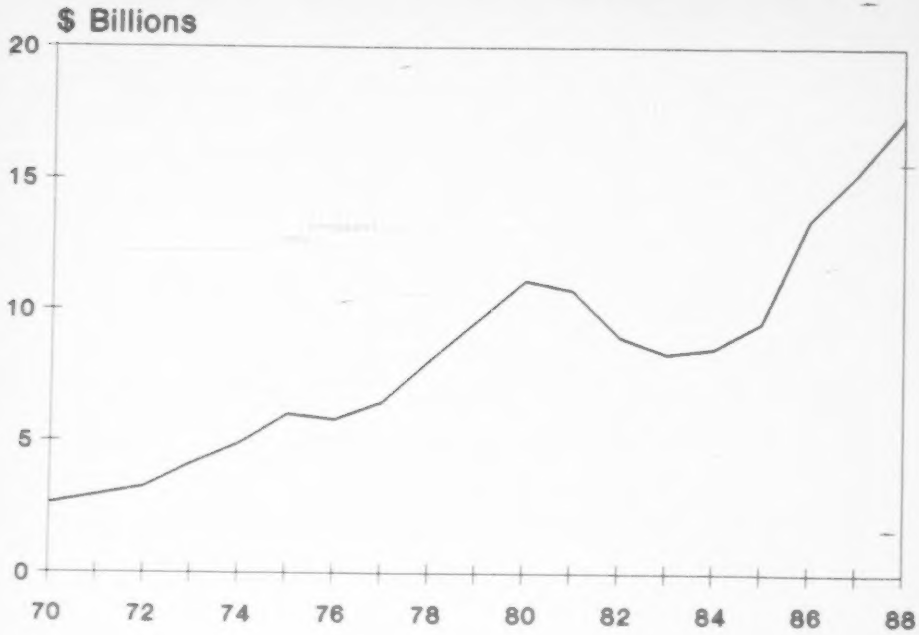
* - Countries with controlled currencies; conversions as follows: the the Soviet Union, Bulgaria, Czechoslovakia and Poland at 70% of the official rate; GDR at 65% of the FRG rate; Hungary, PRC (China), and Romania at IMF commercial rates.

Exchange Rates: All free-market currencies have been converted at rates in effect for the period covered.

Notes: Whenever possible, data include complete machine tools only, excluding parts and attachments. Individual items may not add to totals due to rounding.

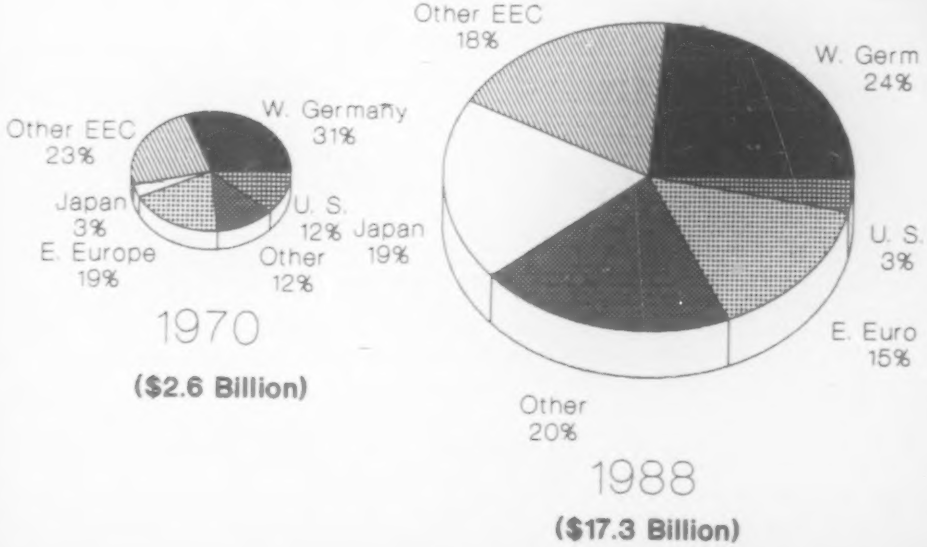
Source: Penton Publishing Inc., "American Machinist."

WORLD EXPORTS OF MACHINE TOOLS



Shares of World Machine Tool Exports

6



1970

($2.6 Billion)

1988

($17.3 Billion)

PRODUCTION, EXPORTS AND IMPORTS OF COMPLETE MACHINE TOOLS

Selected Countries, 1985 To Date

(Millions of U.S. Dollars)

Country	Production			Exports			Imports		
	1985	1986	1987	1985	1986	1987	1985	1986	1987
Austria	$ 120.8	$ NA	$ 153.5	$ 93.9	$ 174.7	$ 191.2	$ 157.8	$ 198.1	$ 249.0
Belgium	93.4	150.8	176.2	132.6	263.3	264.0	166.0	281.6	367.9
Denmark	NA	53.8	59.0	NA	81.0	63.2	NA	167.7	106.7
France	499.3	588.1	697.2	208.5	308.1	284.3	357.5	618.0	737.9
India	165.9	185.2	169.0	22.2	33.4	45.7	NA	128.1	NA
Italy	1,115.6	1,624.6	2,235.2	707.6	969.6	1,048.5	196.4	346.6	566.6
Japan	5,316.7	6,872.3	6,442.5	2,179.0	3,063.4	3,035.0	219.0	272.3	264.3
Netherlands	37.6	NA	45.4	69.7	113.9	118.7	137.7	225.3	236.3
Republic of Korea	NA	NA	530.9	NA	NA	37.6	NA	NA	487.9
Sweden	163.3	226.6	257.5	139.4	164.7	192.7	157.0	229.4	312.4
Switzerland	955.6	1,405.1	1,652.4	836.4	1,259.9	1,435.4	170.1	313.2	359.9
Taiwan	NA	NA	579.0	NA	NA	366.5	NA	NA	184.0
UK	430.4	539.9	601.8	373.3	394.4	500.9	342.4	432.6	529.7
United States	2,638.0	2,747.9	2,582.7	388.0	546.6(r)	586.7	1,689.0	2,218.0(r)	1,968.9
West Germany	3,168.2	5,185.9	6,391.7	3,825.2	5,419.5	3,218.6	612.8	1,055.0	1,131.4

NA - Not Available. r - Revised.

Notes:

- Individual items may not add up to Total due to rounding.
- Exchange rates used to convert the national currencies into U.S. dollars are the annual averages for 1987 published in the International Monetary Fund's "International Financial Statistics", data series "rf".

Source: International Statistics on Machine Tools, prepared jointly by CECIMO (Comite European de Cooperation des Industries de la Machine-Outil; IMTMA (Indian Machine Tool Manufacturers' Association); JMTBA (Japan Machine Tool Builders' Association and NMTBA - The Association for Manufacturing Technology.

PRODUCTION, EXPORTS AND IMPORTS OF COMPLETE MACHINE TOOLS

Selected Countries, 1987

(Millions of U.S. Dollars)

Country	Production			Exports			Imports		
	Total	Cutting	Forming	Total	Cutting	Forming	Total	Cutting	Forming
Austria	$ 153.5	$ 128.2	$ 25.3	$ 191.2	$ 144.6	$ 46.6	$ 249.0	$ 148.9	$100.1
Belgium	176.2	32.8	143.4	264.0	158.0	106.0	367.9	293.4	74.5
Denmark	59.0	30.3	28.7	63.2	32.8	30.4	106.7	77.5	29.2
France	697.2	556.0	141.2	284.3	167.8	116.5	737.9	548.0	189.9
India	169.0	146.4	22.6	45.7	45.2	0.5	NA	NA	NA
Italy	2,235.2	1,660.4	574.8	1,048.5	578.5	470.0	566.6	421.1	145.5
Japan	6,442.5	4,778.5	1,664.0	3,035.0	2,049.1	985.9	264.3	152.6	111.7
Netherlands	45.4	31.6	13.8	118.7	59.0	59.7	236.3	155.4	80.9
Republic of Korea	530.9	393.5	137.4	37.6	32.8	4.8	487.9	341.9	146.0
Sweden	257.5	158.3	99.2	192.7	120.5	72.2	312.4	221.9	90.5
Switzerland	1,652.4	1,465.9	186.4	1,435.4	NA	NA	359.9	NA	NA
Taiwan	579.0	483.6	95.4	366.5	291.0	75.5	184.0	123.9	60.1
UK	601.8	508.9	92.9	500.9	382.1	118.8	529.7	401.9	127.8
United States	2,582.7	1,780.6	802.1	586.7	338.9	274.8	1,968.9	1,416.1	552.8
West Germany	6,391.7	4,652.6	1,739.1	3,218.6	2,325.5	893.1	1,131.4	891.1	240.3

NA - Not Available.

Notes: Individual items may not add up to Total due to rounding.

Source: International Statistics of Machine Tools.

PRODUCTION OF COMPLETE METAL CUTTING MACHINE TOOLS

Selected Countries, 1987

Values in Millions of $

Country	Total	Boring Machines	Drilling Machines	Gear Cutting & Finishing	Grinding & Polishing	Lathes	Milling Machines	Other Metal Cutting(c)
Austria	$ 128.2	NA	$ 14.6	NA	$ 13.1	$ 43.7	$ 26.3	$ 30.4
Belgium	32.8	NA	NA	NA	NA	NA	NA	32.8
Denmark	30.3	$ 2.1(d)	3.7	NA	18.4	0.1	2.9	3.1
France	556.1	(f)	4.9(e)	—(f)	25.0	251.9(b)	62.6	211.6
India	146.4	11.9	7.9	$ 3.7	21.7	74.8(b)	17.8	8.6
Italy	1,660.4	81.2(a)	43.4	22.1	157.9	849.5(b)	212.7	293.7
Japan	4,788.5	95.8(a)	101.3	88.5	571.0	2,391.2(b)	258.1	1,272.6
Netherlands	31.6	NA	NA	NA	NA	NA	NA	31.6
Republic of Korea	393.5	8.4	13.5	8.6	25.4	187.3(b)	54.0	96.2
Sweden	158.3	NA	NA	NA	NA	NA	NA	158.3
Switzerland	1,465.9	NA	NA	NA	NA	NA	NA	NA
Taiwan	483.6	5.2	89.1	0.2	65.1	164.4(b)	68.4	91.1
UK	508.8	47.4	4.1	(f)	45.5	272.7(b)	21.8	117.3
United States	1,780.6	106.8	46.5	52.6	379.5	778.7(b)	213.6	202.9
West Germany	4,652.6	133.9(a)	103.7	233.1	850.1	2,035.1(b)	637.3	659.4

Notes:

NA - Not Available.
(a) - Includes Jig Boring Machines.
(b) - Includes Machining Centers and Transfer Lines.
(c) - Includes Planing, Shaping, Slotting, Sawing, Cutoff, EDM, ECM, Threading & Tapping Machine Tools.
(d) - Includes only Jig Boring Machines.
(e) - NC Machines are included in Other Metal Cutting.
(f) - Included in Other Metal Cutting.

Individual items may not add up to Total due to rounding.

Source: International Statistics of Machine Tools, 1987.

PRODUCTION OF COMPLETE METAL FORMING MACHINE TOOLS

Selected Countries, 1987

(Millions of U.S. Dollars)

Country	Total	Punching & Shearing	Presses, Including Forging	Other Metal Forming(a)
Austria	$ 25.3	$ 3.9	$ 9.3(b)	$ 12.1
Belgium	143.4	NA	NA	143.4
Denmark	28.7	7.5	11.3	9.9
France	141.2	22.0	21.9(b)	97.3
India	22.6	2.4	17.2	3.0
Italy	574.8	62.1	172.3(b)	340.4
Japan	1,664.0	105.5	1,410.0	148.5
Netherlands	13.8	NA	4.4(b)	9.4
Republic of Korea	137.4	1.6	119.2(b)	16.6
Sweden	99.2	NA	NA	99.2
Switzerland	186.4	NA	NA	NA
Taiwan	95.4	NA	NA	95.4
UK	92.9	NA	16.6	76.3
United States	802.1	162.2	307.0	332.9
West Germany	1,739.1	377.3	648.6	713.2

Notes:

NA - Not Available.
(a) - Includes Sheet Metal Working, Drawing, Thread Rolling, and Wire Working Machine Tools.
(b) - Forges included in Other Metal Forming.

Individual items may not add up to Total due to rounding.

Source: International Statistics of Machine Tools, 1987.

IMPORTS OF COMPLETE METAL CUTTING MACHINE TOOLS
Selected Countries, 1987
(Millions of U.S. Dollars)

Country	Total	Boring Machines	Drilling Machines	Gear Cutting & Finishing	Grinding & Polishing	Lathes	Milling Machines	Other Metal Cutting(b)
Austria	$ 148.9	(g)	$12.6	*	$ 37.3	$ 34.6	$ 36.4	$ 28.0
Belgium	293.4	$182.4(a)	9.0	$ 3.6	26.5	33.8	24.2	13.9
Denmark	77.5	16.2(a)	3.7	0.2	11.6	20.2	10.5	15.0
France	548.0	57.8(a)	31.9	13.8	117.4	128.5	81.1	117.5
India	NA	NA	NA	NA	NA	NA	NA	NA
Italy	421.1	19.5(a)	22.3	16.5	74.2	118.9	70.5	99.3
Japan	152.6	2.4	6.4	16.5	72.2	17.1	14.6	23.4
Netherlands	155.4	20.4	10.2	0.2	29.9	36.5	34.4	23.8
Republic of Korea	341.9	24.2	24.0	33.8	80.7	59.0(c)	42.4	77.8
Sweden	221.9	(g)	10.2	6.8	32.9	56.1	37.5	78.5
Switzerland	NA	NA	NA	NA	NA	NA	NA	NA
Taiwan	123.9	NA	10.1	NA	NA	16.2	17.9	79.8
UK	401.9	18.9	16.0	5.6	64.5	200.3(c)	38.9	57.7
United States	1,416.1(f)	73.9(d)	29.1(d)	50.0(d)	177.6(d)	675.8(c,d)	87.4(d)	322.0(e)
West Germany	891.1	107.4(a)	60.9	17.4	211.5	217.8	135.6	140.4

Notes:

NA - Not available. * - Reported Values under $100,000.

(a) - Includes Jig Boring Machines.

(b) - Includes Planing, Shaping, Slotting, Sawing & Cutoff, EDM, ECM and Threading & Tapping Machine Tools.

(c) - Includes Machining Centers and Transfer Lines.

(d) - Includes only new Metal Cutting Machine Tools valued over $2,500.

(e) - Includes all new Metal Cutting Machine Tools valued under $2,500.

(f) - Includes only new Metal Cutting Machine Tools.

(g) - Included in Other Metal Cutting.

Individual items may not add to Totals due to rounding.

Source: International Statistics of Machine Tools.

IMPORTS OF COMPLETE METAL FORMING MACHINE TOOLS
Selected Countries, 1987
(Millions of U.S. Dollars)

Country	Total	Punching & Shearing	Presses, Including Forging	Other Metal Forming(a)
Austria	$100.1	(e)	$ 18.2	$ 81.9
Belgium	74.5	16.9	16.1	41.5
Denmark	29.2	11.0	4.8	13.4
France	189.9	54.8	45.3	89.8
India	NA	NA	NA	NA
Italy	145.5	30.2	35.6	79.7
Japan	111.7	9.9	56.3	45.5
Netherlands	80.9	26.8	21.3	32.8
Republic of Korea	146.0	NA	NA	146.0
Sweden	90.5	27.1	24.1	39.2
Switzerland	NA	NA	NA	NA
Taiwan	60.1	13.8	9.6	36.7
UK	127.8	35.9	37.2	54.7
United States	552.8(d)	67.1(b)	303.8(b)	181.8(c)
West Germany	240.3	53.4	81.5	105.4

Notes:

NA - Not Available.

(a) - Includes Sheetmetal Working, Drawing, Thread Rolling, & Wire Working Machine Tools.

(b) - Includes only new Metal Forming Machine Tools valued over $2,500.

(c) - Includes all new Metal Forming Machine Tools valued under $2,500.

(d) - Includes only new Metal Forming Machine Tools.

(e) - Included in Other Metal Forming.

Individual items may not add to Total due to rounding.

Source: International Statistics of Machine Tools.

EXPORTS OF COMPLETE METAL CUTTING MACHINE TOOLS

Selected Countries, 1987

(Millions of U.S. Dollars)

Country	Total	Boring Machines	Drilling Machines	Gear Cutting & Finishing	Grinding & Polishing	Lathes	Milling Machines	Other Metal Cutting(h)
Austria	$ 144.6	(d)	$ 17.4	*	$ 14.4	$ 69.9	$ 32.2	$ 10.6(c)
Belgium	158.0	$117.3(a)	1.6	$ 6.6	11.2	15.0	3.1	3.1
Denmark	32.8	2.6(a)	2.6	0.2	18.6	1.7	2.3	4.9
France	167.8	3.6(a)	10.8	2.7	31.1	53.0	35.5	31.1
India	45.2	2.4	0.7	0.8	8.8	24.8	6.9	0.8
Italy	578.5	70.6(a)	35.9	8.5	151.9	95.4	126.5	89.7
Japan	2,049.1	53.8	93.9	44.0	234.3	1,198.2(b)	124.0	300.8
Netherlands	59.0	10.9(a)	6.0	0.2	23.0	9.4	2.9	6.6
Republic of Korea	32.8	0.1	0.2	0.3	0.7	28.8(b)	1.1	1.6
Sweden	120.5	(d)	10.8	0.5	65.7	21.9	19.0	2.6
Switzerland	NA	NA	NA	NA	NA	NA	NA	NA
Taiwan	291.0	(d)	69.3	NA	NA	73.0	56.2	92.3
UK	382.1	43.4	20.9	4.3	76.0	158.9(b)	42.7	35.9
United States	338.9(g)	14.5(e)	10.5(e)	41.5(e)	103.7(e)	100.2(e)	24.7(e)	43.7(f)
West Germany	2,325.5	197.9(a)	67.2	90.5	581.7	860.2(b)	322.6	185.3

Notes:

NA - Not Available. * - Value under $100,000.

(a) - Includes Jig Boring Machine Tools.

(b) - Includes Machining Centers and Transfer Lines.

(c) - Includes Shaping, Slotting, Sawing & Cutoff, and Boring Machine Tools.

(d) - Included in Other Metal Cutting Totals.

(e) - Includes only new Metal Cutting Machine Tools valued over $2,500.

(f) - Includes all new Metal Cutting Machine Tools valued under $2,500.

(g) - Includes only new Metal Cutting Machine Tools.

(h) - Includes Shaping, Slotting, Sawing, Cutoff, EDM, ECM, Threading & Tapping Machine Tools.

Individual items may not add up to Total due to rounding.

Source: International Statistics of Machine Tools, 1987.

EXPORTS OF COMPLETE METAL FORMING MACHINE TOOLS

Selected Countries, 1987

Values in Millions of $

Country	Total	Punching & Shearing	Presses, Including Forging	Other Metal Forming(a)
Austria	$ 46.6	(e)	$ 18.3	$ 28.3
Belgium	106.0	$ 22.3	54.8	28.9
Denmark	30.4	7.7	9.2	13.5
France	116.5	25.5	34.1	56.9
India	0.5	*	*(f)	0.5
Italy	470.0	35.2	133.0	301.8
Japan	985.9	110.6	691.8	183.5
Netherlands	59.7	15.1	11.8	32.8
Republic of Korea	4.8	NA	NA	4.8
Sweden	72.2	22.5	20.8	28.9
Switzerland	NA	NA	NA	NA
Taiwan	75.5	5.1	3.4	67.0
UK	118.8	17.8	41.9	59.1
United States	247.8(d)	22.5(b)	95.0(b)	130.2(c)
West Germany	893.1	192.1	321.1	379.9

Notes:

NA - Not Available. * - Reported Values were under $100,000.

(a) - Includes Sheetmetal Working, Drawing, Thread Rolling, and Wire Working Machine Tools.

(b) - Includes only new Metal Forming Machine Tools valued over $2,500.

(c) - Includes all Metal Foring Machine Tools valued under $2,500.

(d) - Includes only new Metal Forming Machine Tools.

(e) - Included in Other Metal Forming.

(f) - Forges included in Other Metal Forming.

Individual items may not add up to Total due to rounding.

Source: International Statistics of Machine Tools, 1987.

EXPORT MARKET SHARES OF MAJOR MACHINE TOOL PRODUCING COUNTRIES TO SELECTED IMPORTING COUNTRIES

(Values in Millions of Dollars and Percent of Total)

Importing Country and Year	Total Imports	Exporting Country											
		Japan		West Germany		Italy		United States		United Kingdom		France	
		Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Australia													
1983	56.6	18.3	32.3%	6.8	12.0%	5.2	9.2%	7.9	13.9%	4.4	7.8%	1.0	1.8%
1984	93.2	47.7	51.2%	10.6	11.4%	5.4	5.8%	8.2	8.8%	4.6	4.9%	1.9	2.0%
1985	140.9	63.4	45.0%	22.9	16.3%	7.3	5.2%	14.7	10.4%	9.7	6.9%	2.7	1.9%
1986	168.6	88.8	52.7%	28.8	17.1%	6.1	3.6%	8.4	5.0%	11.6	6.9%	5.7	3.4%
1987	141.0	51.1	36.2%	26.2	18.6%	11.1	7.9%	11.5	8.2%	15.0	10.6%	4.4	3.1%
Austria													
1983	94.9	2.5	2.6%	60.3	63.5%	8.3	8.7%	2.3	2.4%	2.4	2.5%	2.0	2.1%
1984	86.0	2.1	2.4%	54.2	63.0%	8.9	10.3%	0.2	0.2%	2.2	2.6%	1.4	1.6%
1985	108.0	2.3	2.1%	71.3	66.0%	9.6	8.9%	0.6	0.6%	1.4	1.3%	1.7	1.6%
1986	227.1	4.7	2.1%	164.3	72.3%	18.6	8.2%	0.9	0.4%	2.6	1.1%	3.2	1.4%
1987	254.9	3.4	1.3%	165.5	64.9%	19.8	7.8%	17.3	6.8%	4.2	1.6%	2.3	0.9%
Belgium & Luxembourg													
1983	121.6	40.0	32.9%	40.0	32.9%	11.1	9.1%	1.5	1.2%	5.2	4.3%	7.3	6.0%
1984	124.4	42.6	34.2%	36.0	28.9%	9.6	7.7%	4.3	3.5%	6.3	5.1%	6.6	5.3%
1985	167.0	62.8	37.6%	52.4	31.4%	13.4	8.0%	2.4	1.4%	6.1	3.7%	7.2	4.3%
1986	295.6	109.7	37.1%	75.9	25.7%	21.9	7.4%	23.6	8.0%	7.6	2.6%	13.2	4.5%
1987	351.2	122.7	34.9%	117.1	33.3%	19.2	5.5%	12.6	3.6%	21.1	6.0%	12.3	3.5%
Brazil													
1983	53.3	11.2	21.0%	15.8	29.6%	8.8	16.5%	11.0	20.6%	1.3	2.4%	0.3	0.6%
1984	35.6	3.7	10.4%	7.4	20.8%	2.2	6.2%	18.4	51.7%	0.3	0.8%	0.2	0.6%
1985	46.3	4.7	10.2%	11.6	25.1%	2.7	5.8%	22.6	48.9%	0.6	1.3%	0.2	0.4%
1986	74.5	12.7	17.0%	25.1	33.7%	6.6	8.9%	17.0	22.8%	0.9	1.2%	0.3	0.4%
1987	143.0	30.4	21.3%	40.1	28.0%	16.8	11.7%	26.7	18.7%	4.2	2.9%	1.4	1.0%
Bulgaria													
1983	92.7	8.1	8.7%	39.7	42.8%	1.8	1.9%	Z	0.0%	1.3	1.4%	0.4	0.4%
1984	58.4	2.0	3.4%	23.2	39.7%	5.0	8.6%	Z	0.0%	2.1	3.6%	1.9	3.3%
1985	83.7	3.9	4.7%	43.3	51.7%	8.6	10.3%	2.0	2.4%	0.6	0.7%	1.3	1.6%
1986	141.5	22.1	15.6%	56.2	39.7%	10.3	7.3%	1.2	0.8%	1.2	0.8%	1.6	1.1%
1987	140.2	2.0	1.4%	80.7	57.6%	5.7	4.1%	3.1	2.2%	0.4	0.3%	0.3	0.2%
Canada													
1983	111.9	14.5	13.0%	13.9	12.4%	4.8	4.3%	58.9	52.6%	7.0	6.3%	3.4	3.0%
1984	167.9	23.8	14.2%	19.6	11.7%	7.7	4.6%	79.6	47.4%	9.8	5.8%	7.5	4.5%
1985	223.8	40.5	18.1%	33.3	14.9%	24.4	10.9%	81.7	36.5%	19.0	8.5%	3.1	1.4%
1986	366.7	122.3	33.4%	75.3	20.5%	28.7	7.8%	82.9	22.6%	17.2	4.7%	6.7	1.8%
1987	326.4	67.0	20.5%	89.7	27.5%	16.3	5.0%	97.1	29.7%	23.8	7.3%	4.5	1.4%

Note: Footnotes on final page of table.

EXPORT MARKET SHARES OF MAJOR MACHINE TOOL PRODUCING COUNTRIES TO SELECTED IMPORTING COUNTRIES

(Values in Millions of Dollars and Percent of Total)

Importing Country and Year	Total Imports	Exporting Country											
		Japan		West Germany		Italy		United States		United Kingdom		France	
		Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
China (PRC)													
1983	81.2	14.1	17.4%	12.2	15.0%	6.0	7.4%	17.3	21.3%	3.8	4.7%	0.8	1.0%
1984	106.8	41.6	39.0%	17.8	16.7%	10.0	9.4%	13.8	12.9%	1.5	1.4%	2.2	2.1%
1985	346.7	149.4	43.1%	73.3	21.1%	26.7	7.7%	28.6	8.2%	13.8	4.0%	4.3	1.2%
1986	658.5	257.3	39.1%	179.9	27.3%	47.9	7.3%	52.7	8.0%	18.2	2.8%	5.8	0.9%
1987	449.6	144.7	32.2%	149.7	33.3%	28.7	6.4%	40.3	9.0%	10.2	2.3%	4.5	1.0%
Czechoslovakia													
1983	60.1	0.8	1.3%	28.3	47.0%	2.5	4.2%	1.3	2.2%	0.1	0.2%	0.2	0.3%
1984	67.8	Z	0.0%	24.9	36.7%	6.5	9.6%	0.8	1.2%	0.2	0.3%	1.3	1.9%
1985	68.2	Z	0.0%	30.0	44.0%	3.9	5.7%	1.3	1.9%	2.1	3.1%	1.4	2.1%
1986	88.4	0.2	0.2%	34.4	38.9%	3.9	4.4%	0.7	0.8%	2.1	2.4%	3.7	4.2%
1987	110.5	0.5	0.5%	52.7	47.7%	7.8	7.1%	0.1	0.1%	1.1	1.0%	1.9	1.7%
Denmark													
1983	37.0	4.3	11.6%	14.5	39.2%	4.0	10.8%	0.4	1.1%	2.5	6.8%	0.6	1.6%
1984	53.2	7.6	14.3%	19.0	35.7%	4.1	7.7%	0.8	1.5%	2.7	5.1%	1.1	2.1%
1985	78.4	12.9	16.5%	28.2	36.0%	5.7	7.3%	1.0	1.3%	5.0	6.4%	1.1	1.4%
1986	115.3	20.1	17.4%	46.3	40.2%	8.4	7.3%	0.5	0.4%	4.5	3.9%	1.3	1.1%
1987	103.2	12.2	11.8%	40.5	39.2%	8.4	8.1%	1.3	1.3%	3.0	2.9%	2.6	2.5%
Finland													
1983	54.1	8.9	16.5%	16.0	29.6%	6.7	12.4%	1.0	1.8%	1.7	3.1%	2.3	4.3%
1984	51.4	9.7	18.9%	18.7	36.4%	4.7	9.1%	0.4	0.8%	2.7	5.3%	0.8	1.6%
1985	59.3	12.3	20.7%	18.1	30.5%	8.0	13.5%	0.9	1.5%	4.2	7.[illegible]	0.9	1.5%
1986	78.7	15.3	19.4%	22.5	28.6%	9.1	11.6%	0.4	0.5%	4.8	6.1%	3.5	4.4%
1987	97.6	19.8	20.3%	30.5	31.3%	6.8	7.0%	0.8	0.8%	6.2	6.4%	2.5	2.6%
France													
1983	432.2	15.4	3.6%	198.5	45.9%	92.7	21.4%	13.3	3.1%	23.8	5.5%	—	—
1984	276.7	14.2	5.1%	96.6	34.9%	54.0	19.5%	13.7	5.0%	15.3	5.5%	—	—
1985	329.4	25.7	7.8%	114.2	34.7%	65.1	19.8%	7.8	2.4%	17.2	5.2%	—	—
1986	578.6	35.6	6.2%	198.9	34.4%	119.1	20.6%	10.6	1.8%	27.6	4.8%	—	—
11987	685.8	37.2	5.4%	245.7	35.8%	136.9	20.0%	10.6	1.5%	34.5	5.0%	—	—
Germany, East													
1983	145.2	25.7	17.7%	NA	NA	2.7	1.9%	Z	0.0%	11.8	8.1%	1.1	0.8%
1984	56.8	3.8	6.7%	NA	NA	4.2	7.4%	Z	0.0%	0.3	0.5%	1.9	3.3%
1985	27.7	4.7	17.0%	NA	NA	5.0	18.1%	0.2	0.7%	Z	0.0%	9.7	35.0%
1986	79.0	0.3	0.4%	NA	NA	1.2	1.5%	Z	0.0%	1.5	1.9%	21.6	27.3%
1987	91.5	1.9	2.1%	NA	NA	10.2	11.1%	Z	0.0%	0.6	0.7%	5.8	6.3%

Note: Footnotes on final page of table.

EXPORT MARKET SHARES OF MAJOR MACHINE TOOL PRODUCING COUNTRIES TO SELECTED IMPORTING COUNTRIES

(Values in Millions of Dollars and Percent of Total)

Importing Country and Year	Total Imports	Exporting Country											
		Japan		West Germany		Italy		United States		United Kingdom		France	
		Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Germany, West													
1983	430.8	61.0	14.2%	—	—	57.9	13.4%	32.4	7.5%	26.1	6.1%	22.3	5.2%
1984	456.0	78.4	17.2%	—	—	59.8	13.1%	22.6	5.0%	27.7	6.1%	21.2	4.6%
1985	639.9	138.8	21.7%	—	—	103.9	16.2%	23.8	3.7%	32.9	5.1%	27.5	4.3%
1986	1,036.7	210.5	20.3%	—	—	140.3	13.5%	38.0	3.7%	45.0	4.3%	39.2	3.8%
1987	1,172.8	211.3	18.0%	—	—	157.7	13.4%	36.2	3.1%	52.8	4.5%	50.9	4.3%
Hong Kong													
1983	21.4	11.2	52.3%	1.3	6.1%	0.6	2.8%	2.2	10.3%	0.9	4.2%	1.0	4.7%
1984	29.8	15.9	53.4%	2.1	7.0%	0.4	1.3%	2.9	9.7%	1.2	4.0%	0.3	1.0%
1985	45.5	23.6	51.9%	2.9	6.4%	1.2	2.6%	4.8	10.5%	2.0	4.4%	0.8	1.8%
1986	58.3	31.6	54.2%	2.8	4.8%	2.5	4.3%	2.3	3.9%	2.1	3.6%	2.4	4.1%
1987	68.2	43.8	64.2%	3.2	4.7%	1.4	2.1%	4.3	6.3%	2.2	3.2%	0.7	1.0%
Hungary													
1983	27.8	5.7	20.5%	11.3	40.6%	0.8	2.9%	Z	0.0%	0.6	2.2%	2.4	8.6%
1984	19.6	0.2	1.0%	8.7	44.4%	0.9	4.6%	1.2	6.1%	0.6	3.1%	Z	0.0%
1985	24.1	0.6	2.5%	11.9	49.4%	0.7	2.9%	0.8	3.3%	0.3	1.2%	0.4	1.7%
1986	30.3	0.6	2.0%	16.8	55.4%	1.5	5.0%	0.2	0.7%	0.3	1.0%	0.1	0.3%
1987	39.7	Z	0.0%	26.2	66.0%	1.7	4.3%	1.1	2.8%	Z	0.0%	0.2	0.5%
India													
1983	135.6	34.8	25.7%	48.0	35.4%	5.6	4.1%	6.4	4.7%	14.3	10.5%	1.7	1.3%
1984	137.6	47.5	34.5%	41.6	30.2%	3.8	2.8%	5.4	3.9%	11.1	8.1%	3.4	2.5%
1985	143.7	55.2	38.4%	33.5	23.3%	10.3	7.2%	6.2	4.3%	11.5	8.0%	6.0	4.2%
1986	180.2	55.9	31.0%	57.5	31.9%	8.4	4.7%	9.7	5.4%	13.0	7.2%	2.8	1.6%
1987	180.9	34.1	18.9%	73.0	40.4%	10.5	5.8%	7.8	4.3%	9.6	5.3%	2.9	1.6%
Indonesia													
1983	45.9	25.5	55.6%	8.7	19.0%	1.2	2.6%	0.9	2.0%	1.1	2.4%	1.2	2.6%
1984	51.0	24.8	48.6%	6.9	13.5%	1.3	2.5%	0.8	1.6%	1.0	2.0%	1.1	2.4%
1985	38.3	17.1	44.6%	6.5	17.0%	3.0	7.8%	3.2	8.4%	0.9	2.3%	2.7	7.0%
1986	36.0	18.6	51.7%	4.8	13.3%	2.4	6.7%	1.5	4.2%	0.1	0.3%	0.7	1.9%
1987	79.1	51.7	65.4%	9.7	12.3%	2.9	3.7%	1.6	2.0%	1.1	1.4%	1.0	1.3%
Israel													
1983	61.1	20.4	33.4%	12.5	20.5%	6.3	10.3%	7.0	11.5%	4.2	6.9%	2.5	4.1%
1984	71.2	28.9	40.6%	11.9	16.7%	5.7	8.0%	8.5	11.9%	2.8	3.9%	3.9	5.5%
1985	56.3	19.3	34.3%	12.4	22.0%	6.1	10.8%	4.5	8.0%	3.6	6.4%	0.8	1.4%
1986	56.0	11.9	21.6%	12.6	22.9%	8.1	14.7%	5.2	9.5%	3.9	7.1%	2.1	3.8%
1987	53.2	13.0	24.4%	12.5	23.5%	9.8	18.4%	2.5	4.7%	2.7	5.1%	0.9	1.7%

Note: Footnotes on final page of table.

EXPORT MARKET SHARES OF MAJOR MACHINE TOOL PRODUCING COUNTRIES TO SELECTED IMPORTING COUNTRIES

(Values in Millions of Dollars and Percent of Total)

Importing Country and Year	Total Imports	Exporting Country: Japan Value	Japan %	West Germany Value	West Germany %	Italy Value	Italy %	United States Value	United States %	United Kingdom Value	United Kingdom %	France Value	France %
Italy													
1983	178.3	7.0	3.9%	73.6	41.3%	—	—	15.6	8.7%	7.0	3.9%	14.2	8.0%
1984	174.2	7.1	4.1%	80.7	46.3%	—	—	6.9	4.0%	8.3	4.8%	9.4	5.4%
1985	178.1	10.1	5.7%	71.5	40.1%	—	—	11.5	6.5%	6.5	3.6%	8.8	4.9%
1986	318.1	20.9	6.6%	129.6	40.7%	—	—	16.3	5.1%	15.9	5.0%	19.0	6.0%
1987	535.5	38.4	7.2%	266.9	49.8%	—	—	17.5	3.3%	24.7	4.6%	21.3	4.0%
Japan													
1983	141.0	—	—	41.9	29.7%	6.3	4.5%	37.2	26.4%	2.0	1.4%	1.2	0.9%
1984	163.8	—	—	36.0	22.0%	6.6	4.0%	41.2	25.2%	2.8	1.7%	1.4	0.9%
1985	184.2	—	—	45.7	24.8%	6.8	3.7%	39.1	21.2%	4.4	2.4%	1.0	0.5%
1986	242.1	—	—	86.6	35.8%	9.0	3.7%	53.8	22.2%	4.3	1.8%	1.5	0.6%
1987	194.0	—	—	59.9	30.9%	7.7	4.0%	54.9	28.3%	3.7	1.9%	2.2	1.1%
Korea, South													
1983	142.9	114.6	80.2%	8.9	6.2%	2.3	1.6%	9.5	6.6%	1.6	1.1%	0.1	0.1%
1984	153.0	106.7	69.7%	25.2	16.5%	1.6	1.0%	8.5	5.6%	0.7	0.5%	0.4	0.3%
1985	243.2	193.2	79.4%	20.1	8.3%	1.9	0.8%	14.2	5.8%	1.3	0.5%	0.1	0.0%
1986	331.4	232.6	70.2%	40.7	12.3%	3.5	1.1%	31.6	9.5%	4.2	1.3%	0.5	0.2%
1987	540.4	352.8	65.3%	52.1	9.6%	9.3	1.7%	87.9	16.3%	6.9	1.3%	1.0	0.2%
Mexico													
1983	189.7	18.6	9.8%	15.7	8.3%	12.3	6.5%	47.7	25.1%	11.8	6.2%	70.0	36.9%
1984	154.3	28.1	18.2%	14.2	9.2%	4.8	3.1%	51.1	33.1%	0.7	0.5%	35.6	23.1%
1985	149.8	22.5	15.0%	20.3	13.6%	8.1	5.4%	69.5	46.4%	2.5	1.7%	3.0	2.0%
1986	152.4	12.0	7.9%	25.8	16.9%	5.5	3.6%	93.9	61.6%	1.5	1.0%	0.9	0.6%
1987	140.1	9.3	6.6%	22.0	15.7%	5.4	3.9%	91.7	65.5%	0.6	0.4%	0.4	0.3%
Netherlands													
1983	79.0	5.5	7.0%	35.1	44.4%	5.6	7.1%	3.4	4.3%	4.1	5.2%	1.8	2.3%
1984	110.1	7.5	6.8%	54.6	49.6%	6.8	6.2%	2.9	2.6%	5.2	4.7%	3.0	2.7%
1985	135.7	13.1	9.7%	63.6	46.9%	10.5	7.7%	3.9	2.9%	7.7	5.7%	3.3	2.4%
1986	213.1	16.9	7.9%	110.0	51.6%	15.1	7.1%	4.0	1.9%	10.2	4.8%	5.3	2.5%
1987	218.5	12.7	5.8%	112.0	51.3%	16.8	7.7%	4.6	2.1%	13.4	6.1%	5.4	2.5%
Poland													
1983	72.7	1.2	1.7%	15.8	21.7%	4.0	5.5%	2.0	2.8%	5.1	7.0%	0.6	0.8%
1984	79.7	1.2	1.5%	11.4	14.3%	8.0	10.0%	0.6	0.8%	1.4	1.8%	3.2	4.0%
1985	49.4	1.9	3.8%	19.0	38.5%	6.1	12.3%	1.2	2.4%	0.7	1.4%	[illegible]	2.6%
1986	121.9	3.3	2.7%	25.2	20.7%	10.5	8.6%	0.7	0.6%	1.1	0.9%	1.0	0.8%
1987	85.4	1.6	1.9%	37.5	43.9%	10.0	11.7%	4.0	4.7%	1.6	1.9%	2.7	3.2%

Note: Footnotes on final page of table.

EXPORT MARKET SHARES OF MAJOR MACHINE TOOL PRODUCING COUNTRIES TO SELECTED IMPORTING COUNTRIES

(Values in Millions of Dollars and Percent of Total)

		Exporting Country											
Importing Country and Year	Total Imports	Japan		West Germany		Italy		United States		United Kingdom		France	
		Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Portugal													
1983	26.9	0.2	0.7%	13.8	51.3%	4.2	15.6%	0.3	1.1%	1.3	4.8%	1.3	4.8%
1984	21.9	0.6	2.7%	6.5	29.7%	3.1	14.2%	0.3	1.4%	0.9	4.1%	5.1	23.3%
1985	20.6	0.6	2.9%	5.7	27.7%	4.2	20.4%	0.2	1.0%	0.9	4.4%	1.4	6.8%
1986	30.7	0.1	0.3%	6.7	21.8%	9.5	30.9%	0.2	0.7%	1.2	3.9%	2.0	6.5%
1987	46.1	1.0	2.2%	8.3	18.0%	9.5	20.6%	1.1	2.4%	3.5	7.6%	3.1	6.7%
Romania													
1983	35.8	Z	0.0%	6.1	17.0%	9.1	25.4%	Z	0.0%	0.3	0.8%	4.3	12.0%
1984	25.1	Z	0.0%	1.6	6.4%	Z	0.0%	Z	0.0%	0.3	1.2%	3.9	15.5%
1985	7.2	0.1	1.4%	2.7	37.5%	0.2	2.8%	Z	0.0%	Z	0.0%	2.0	27.8%
1986	41,4	Z	0.0%	1.6	3.9%	0.8	1.9%	Z	0.0%	Z	0.0%	Z	0.0%
1987	2.7	Z	0.0%	6.0	222.2%	0.2	7.4%	Z	0.0%	Z	0.0%	Z	0.0%
Singapore													
1983	66.1	32.7	49.5%	7.8	11.8%	2.8	4.2%	9.2	13.9%	2.5	3.8%	0.6	0.9%
1984	77.3	47.3	61.2%	7.0	9.1%	2.0	2.6%	5.0	6.5%	3.3	4.3%	1.2	1.6%
1985	68.0	30.5	44.9%	4.8	7.1%	3.6	5.3%	13.5	19.9%	5.2	7.6%	0.8	1.2%
1986	65.4	37.6	57.5%	5.5	8.4%	2.1	3.2%	8.9	13.6%	2.3	3.5%	0.2	0.3%
1987	109.3	72.7	66.5%	9.5	8.7%	3.8	3.5%	10.2	9.3%	2.7	2.5%	0.9	0.8%
South Africa													
1983	126.9	16.7	13.2%	37.7	29.7%	14.9	11.7%	5.4	4.3%	23.8	18.8%	6.6	5.2%
1984	92.8	19.2	20.7%	27.0	29.1%	17.5	18.9%	3.5	3.8%	13.1	14.1%	2.1	2.3%
1985	60.1	8.4	14.0%	22.6	37.6%	5.0	8.3%	4.6	7.7%	7.3	12.1%	0.4	0.7%
1986	31.7	5.2	16.4%	8.2	25.9%	3.8	12.0%	1.6	5.0%	4.2	13.2%	0.9	2.8%
1987	43.3	8.9	20.6%	10.8	24.9%	5.5	12.7%	2.0	4.6%	8.5	19.6%	1.5	3.5%
Soviet Union													
1983	956.3	82.4	8.6%	373.0	39.0%	64.5	6.7%	7.5	0.8%	14.5	1.5%	14.0	1.5%
1984	789.1	60.4	7.7%	250.9	31.8%	45.2	5.7%	0.6	0.1%	14.4	1.8%	11.7	1.5%
1985	518.4	125.9	24.3%	170.7	32.9%	42.7	8.2%	1.2	0.2%	9.2	1.8%	10.9	2.1%
1986	814.6	59.8	7.3%	255.5	31.4%	73.4	9.0%	1.3	0.2%	3.2	0.4%	5.5	0.7%
1987	697.9	86.9	12.5%	255.7	36.6%	77.5	11.1%	3.2	0.5%	14.8	2.1%	24.1	3.5%
Spain													
1983	83.4	3.3	4.0%	34.8	41.7%	10.8	12.9%	2.0	2.4%	2.2	2.6%	20.6	24.7%
1984	54.7	2.6	4.8%	20.3	37.1%	8.4	15.4%	2.8	5.1%	4.6	8.4%	5.1	9.3%
1985	56.7	4.7	8.3%	18.8	33.2%	10.7	18.9%	3.7	6.5%	3.6	6.3%	4.8	8.5%
1986	92.6	11.8	12.7%	28.0	30.2%	20.3	21.9%	3.5	3.8%	6.1	6.6%	6.4	6.9%
1987	202.3	19.2	9.5%	51.8	25.6%	54.1	26.7%	3.0	1.5%	29.6	14.6%	12.5	6.2%

Note: Footnotes on fina' page of table.

EXPORT MARKET SHARES OF MAJOR MACHINE TOOL PRODUCING COUNTRIES TO SELECTED IMPORTING COUNTRIES

(Values in Millions of Dollars and Percent of Total)

Importing Country and Year	Total Imports	Exporting Country											
		Japan		West Germany		Italy		United States		United Kingdom		France	
		Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Sweden													
1983	120.2	15.4	12.8%	55.9	46.5%	9.3	7.7%	2.8	2.3%	11.0	9.2%	3.7	3.1%
1984	123.0	19.6	15.9%	53.4	43.4%	9.8	8.0%	4.1	3.3%	8.4	6.8%	2.5	2.0%
1985	158.4	27.4	17.3%	69.6	43.9%	12.6	8.0%	3.7	2.3%	9.3	5.9%	2.8	1.8%
1986	235.7	37.7	16.0%	96.4	40.9%	19.1	8.1%	5.8	2.5%	10.6	4.5%	4.0	1.7%
1987	287.2	47.3	16.5%	116.6	40.6%	27.2	9.5%	5.8	2.0%	18.4	6.4%	4.8	1.7%
Switzerland													
1983	114.8	8.7	7.6%	61.6	53.7%	14.2	12.4%	5.3	4.6%	6.7	5.8%	8.7	7.6%
1984	141.9	13.3	9.4%	73.4	51.7%	22.4	15.8%	5.6	3.9%	7.0	4.9%	8.8	6.2%
1985	173.8	23.7	13.6%	93.8	54.0%	21.9	12.6%	4.6	2.6%	8.0	4.6%	9.2	5.3%
1986	317.0	36.7	11.6%	181.3	57.2%	41.7	13.2%	6.0	1.9%	10.5	3.3%	18.0	5.7%
1987	368.0	36.6	9.9%	217.3	59.0%	53.4	14.5%	5.0	1.4%	11.2	3.0%	18.9	5.1%
Taiwan, ROC													
1983	110.5	65.6	59.4%	13.9	12.6%	6.6	6.0%	9.7	8.8%	2.5	2.3%	0.8	0.7%
1984	109.1	79.3	72.7%	8.5	7.8%	2.6	2.4%	5.8	5.3%	1.6	1.5%	1.7	1.6%
1985	82.5	52.3	63.4%	8.5	10.3%	3.3	4.0%	7.0	8.5%	2.1	2.5%	0.9	1.1%
1986	111.8	74.8	66.9%	12.8	11.4%	0.8	0.7%	12.5	11.2%	1.1	1.0%	1.4	1.3%
1987	218.9	155.9	71.2%	24.1	11.0%	4.5	2.1%	11.8	5.4%	1.1	0.5%	3.8	1.7%
Thailand													
1983	31.1	14.5	46.6%	5.7	18.3%	1.0	3.2%	2.4	7.7%	1.5	4.8%	0.1	0.3%
1984	56.0	33.4	59.6%	3.6	6.4%	1.7	3.0%	1.9	3.4%	1.4	2.5%	1.0	1.8%
1985	53.9	25.8	47.9%	8.7	16.1%	1.1	2.0%	1.8	3.3%	0.9	1.7%	0.1	0.2%
1986	30.8	15.4	50.0%	3.3	10.7%	1.2	3.9%	0.3	1.0%	2.2	7.1%	1.4	4.5%
1987	69.6	44.5	63.9%	7.7	11.1%	2.1	3.0%	1.9	2.7%	2.0	2.9%	0.6	0.9%
Turkey													
1983	71.3	2.3	3.2%	31.1	43.6%	24.4	34.2%	3.4	4.8%	2.5	3.5%	3.4	4.8%
1984	66.1	0.2	0.3%	21.6	32.7%	28.0	42.4%	6.7	10.1%	2.1	3.2%	0.7	1.1%
1985	79.4	0.7	0.9%	22.6	28.5%	35.6	44.8%	6.8	8.6%	2.5	3.1%	4.5	5.7%
1986	81.9	1.9	2.3%	26.1	31.9%	14.4	17.6%	18.7	22.8%	4.3	5.3%	3.8	4.6%
1987	72.4	2.1	2.9%	28.1	38.8%	19.8	27.3%	11.6	16.0%	3.8	5.2%	0.5	0.7%
United Kingdom													
1983	268.7	43.8	16.3%	88.8	33.0%	18.7	7.0%	37.7	14.0%	—	—	14.9	5.5%
1984	324.2	60.6	18.7%	109.6	33.8%	26.0	8.0%	42.6	13.1%	—	—	11.1	3.4%
1985	369.4	69.0	18.7%	121.6	32.9%	31.5	8.5%	32.6	8.8%	—	—	12.7	3.4%
1986	535.6	88.5	16.5%	182.3	34.0%	42.9	8.0%	45.9	8.6%	—	—	16.6	3.1%
1987	514.4	114.6	22.3%	183.2	35.6%	38.4	7.5%	26.1	5.1%	—	—	17.5	3.4%

Note: Footnotes on final page of table.

EXPORT MARKET SHARES OF MAJOR MACHINE TOOL PRODUCING COUNTRIES TO SELECTED IMPORTING COUNTRIES

(Values in Millions of Dollars and Percent of Total)

Importing Country and Year	Total Imports	Exporting Country											
		Japan		West Germany		Italy		United States		United Kingdom		France	
		Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
United States													
1983	891.2	416.0	46.7%	115.7	13.0%	39.1	4.4%	—	—	85.5	6.6%	17.1	1.9%
1984	1,442.8	740.0	51.3%	190.5	13.2%	57.8	4.0%	—	—	81.7	5.7%	23.5	1.6%
1985	1,702.1	839.3	49.3%	235.5	13.8%	94.8	5.6%	—	—	88.6	5.2%	19.0	1.1%
1986	2,374.4	1,315.3	55.4%	394.5	16.6%	130.0	5.5%	—	—	94.5	4.0%	41.1	1.7%
1987	1,991.5	1,091.5	54.8%	372.6	18.7%	86.3	4.3%	—	—	97.6	4.9%	15.0	0.8%
Yugoslavia													
1983	143.4	1.9	1.3%	78.7	54.9%	10.4	7.3%	0.8	0.6%	0.7	0.5%	4.0	2.8%
1984	108.9	0.4	0.4%	60.7	55.7%	7.3	6.7%	1.3	1.2%	0.9	0.8%	8.3	7.6%
1985	63.4	2.2	3.5%	39.1	61.7%	6.1	9.6%	0.7	1.1%	1.3	2.1%	4.1	6.5%
1986	117.7	2.5	2.1%	67.2	57.1%	13.7	11.6%	1.8	1.5%	1.4	1.2%	0.6	0.5%
1987	135.4	1.5	1.1%	96.3	71.1%	13.9	10.3%	1.7	1.3%	0.6	0.4%	0.7	0.5%

NA - Not Available. Z - Less than $50,000.

Source: United Nations Trade Data System

MACHINE TOOL IMPORTS OF EEC COUNTRIES, 1986

(Thousands of U.S. Dollars)

Code 84.45 Item	Total EEC	West Germany	France	Italy	Benelux Countries (a)	United Kingdom
METAL CUTTING						
01 For fissionable material, NC	$ 516	$ 0	$ 2	$ 0	$ 195	$ 0
03 For fissionable material, not NC	50	0	0	49	0	0
05 Electro erosion, electric, ultrasonic, NC	151,008	70,048	29,630	22,913	8,126	10,354
07 Electro erosion, electric, ultrasonic, not NC	31,688	7,827	6,910	9,215	3,208	2,343
12 Center and copying multiple tool lathes, NC	170,710	46,729	34,602	11,962	16,650	40,166
14 Automatic and turret lathes, NC	171,247	61,921	28,086	18,667	15,316	29,564
16 Automatic and revolving lathes, not parallel, multiple tool, NC	96,513	20,454	15,824	21,003	9,402	21,724
22 Center and copying lathes, multiple tool, not NC	71,024	32,194	10,813	3,183	8,792	9,451
24 Automatic and turret lathes, not NC	80,442	26,666	16,467	10,436	2,905	18,505
26 Automtic and turret lathes, not parallel, multiple tool, not NC	51,527	17,719	7,002	8,477	13,428	0
36 Boring-milling machines, horizontal, NC	89,356	39,802	19,995	3,298	6,937	12,166
37 Boring machines, not boring-milling, NC	18,175	5,859	5,624	924	2,790	2,643
38 Boring-milling, horizontal, not NC	22,106	6,999	4,754	2,730	1,766	4,222
39 Boring machines, not boring-milling, not NC	12,465	2,550	800	2,511	2,462	2,161
41 Planing machines, NC	597	79	21	100	378	0
43 Planing machines, not NC	1,777	488	215	25	494	219
44 Shaping & slotting, broaching, sawing, NC	9,034	2,711	598	333	83	4,017
45 Shaping & slotting, not NC	3,716	443	415	588	426	1,472
46 Broaching machines, not NC	10,344	746	5,297	31	352	3,253
47 Sawing and cut-off machines, not NC	85,008	17,415	16,252	11,951	12,035	13,881
48 Milling machines, NC	220,657	93,549	37,416	23,019	31,907	17,561
49 Radial drilling machines, NC	7,092	2,436	786	299	598	2,416
51 Piercing machines, not drilling, NC	72,734	35,916	11,932	12,640	4,593	5,120
52 Milling machines, not NC	130,021	42,578	21,152	15,303	25,345	14,427
53 Radial drilling machines, not NC	11,026	3,844	1,790	1,010	2,598	1,177
54 Other drilling machines	47,141	13,464	7,490	2,257	9,097	9,153
55 Cylindrical and surface grinding machines (micrometric), NC	85,906	25,952	17,736	13,064	7,610	18,068
56 Grinding, honing, polishing, lapping (micrometric), NC	36,449	19,150	5,951	2,516	5,058	1,246
57 Surface grinding machines, plane surface (micrometric), not NC	34,791	8,083	7,707	2,[illegible]45	6,109	6,935
58 Surface grinding machines, cylindrical surface (micrometric), not NC	66,617	25,481	11,509	3,583	4,511	15,812
59 Other grinding machines, not plane or cylindrical surface, (micrometric), not NC	67,604	21,375	8,229	10,257	8,083	15,516
61 Grinding, honing, polishing, lapping, (micrometric), not NC	54,089	16,930	3,980	7,555	3,659	17,593
62 Grinding, honing, polishing, lapping (not micrometric), NC	15,583	9,337	3,460	1,456	653	0
63 Grinding, honing, polishing, lapping (not micrometric), not NC	68,171	16,187	21,885	7,504	9,867	3,033
64 Jig boring & milling machines, NC	235,771	60,260	20,007	1,784	134,895	9,202
65 Jig boring & milling machines, not NC	8,791	2,167	365	1,837	1,093	2,577
66 Gear cutting machines, cylindrical, NC	9,671	0	3,736	412	2,719	2,175
68 Gear cutting machines, cylindrical, not NC	11,438	1,155	2,518	2,471	473	4,153
69 Gear cutting machines, noncylindrical, NC	4,881	0	2,286	622	749	0
71 Gear cutting machines, noncylindrical, not NC	16,236	8,519	1,287	4,227	1,072	620
93 Screwing and tapping machines by cutting	16,399	2,140	2,958	1,753	2,618	3,931
94 Other metal cutting machines	240,209	12,430	65,094	8,670	7,536	129,658
Total Imports, cutting (EEC)	$2,538,580	$781,603	$462,581	$253,080	$376,588	$456,514

MACHINE TOOL IMPORTS OF EEC COUNTRIES, 1986

(Thousands of U.S. Dollars)
(Continued)

Code 84.45 Item	Total EEC	West Germany	France	Italy	Benelux Countries (a)	United Kingdom
METAL FORMING						
72 Hydraulic presses, NC, other than 8445.81, 82, 88	$ 34,264	$ 11,515	$ 3,505	$ 5,715	$ 6,108	$ 2,534
75 Presses, NC, other than 8445.81, 82, 88	23,713	7,421	5,081	4,135	1,601	3,839
77 Hydraulic presses, not NC, other than 8445.83, 87, 89	50,388	19,649	7,414	2,115	7,912	6,959
78 Nonhydraulic presses, not NC, making rivets, bolts, screws, other than 8445.83 87, 89	28,156	19,030	2,722	3,029	307	1,811
79 Nonhydraulic presses, not NC, not making rivets, bolts, screws, other than 8445.83 87, 89	69,789	14,300	23,602	8,394	10,974	5,211
81 Rolling, bending, folding and planing machines, NC	50,164	20,903	5,222	2,134	8,679	5,924
82 Shearing, punching and stamping, NC	102,771	17,120	26,151	9,464	21,589	12,959
83 Rolling, bending, folding and planing machines, not NC	40,102	11,341	5,236	2,491	6,846	9,256
84 Rolling, bending, folding and planing, not flat products, not NC	47,351	9,262	10,602	4,053	10,432	5,963
85 Hydraulic shearing machines, not NC	35,449	9,753	6,501	795	10,232	5,375
86 Nonhydraulic shearing machines, not NC	24,699	5,207	4,861	1,548	7,275	2,543
87 Punching and stamping machines, not NC	34,715	13,660	3,671	1,490	8,289	3,161
88 Forging and stamping, NC	7,967	526	126	92	996	3,049
89 Forging and stamping, not NC	21,506	6,074	2,805	1,322	1,322	1,051
92 Forming by drawing, bars, tubes, wire etc.	15,600	2,990	1,503	3,517	4,104	2,056
95 Screwing and tapping machines not by cutting	8,420	2,295	1,409	2,008	487	1,186
96 Other metal forming machines for working flat products	14,002	3,247	5,355	723	1,668	2,723
97 Other machines for working wire	51,946	15,277	13,475	4,734	4,315	6,328
Total imports, forming (EEC)	$ 661,002	$189,570	$129,241	$ 57,759	$113,136	$ 81,928
98 MACHINE TOOLS NEC	152,743	26,169	27,999	37,148	19,374	19,835
Grand Total	$3,352,325	$997,342	$619,821	$347,987	$509,098	$558,277

(a) Belgium, Luxembourg, Netherlands.

Source: Statistical Office of the European Communities.

MACHINE TOOL EXPORTS OF EEC COUNTRIES, 1986

(Thousands of U.S. Dollars)

Code 84.45 Item	Total EEC	West Germany	France	Italy	Benelux Countries (a)	United Kingdom
METAL CUTTING						
01 For fissionable material, NC	$ 18	$ 0	$ 13	$ 0	$ 0	$ 0
03 For fissionable material, not NC	58	48	0	2	0	0
05 Electro erosion, electric, ultrasonic, NC	53,897	34,985	5,706	400	583	3,328
07 Electro erosion, electric, ultrasonic, not NC	23,664	13,559	1,144	1,439	1,384	2,973
12 Center and copying multiple tool lathes, NC	116,710	94,713	1,642	6,315	6,653	5,461
14 Automatic and turret lathes, NC	219,491	193,519	9,482	2,293	3,686	8,439
16 Automatic and revolving lathes, not parallel, multiple tool, NC	87,993	42,371	5,178	27,342	2,436	7,079
22 Center and copying lathes, multiple tool, not NC	100,473	32,796	8,681	8,540	5,773	35,710
24 Automatic and turret lathes, not NC	111,089	57,032	6,685	13,351	1,413	26,745
26 Automtic and turret lathes, not parallel, multiple tool, not NC	89,562	35,107	25,504	19,527	3,447	461
36 Boring-milling machines, horizontal, NC	159,294	113,636	3,782	20,897	8,768	11,542
37 Boring machines, not boring-milling, NC	35,866	18,526	1,199	5,549	9,159	758
38 Boring-milling, horizontal, not NC	28,047	3,543	890	8,211	132	7,039
39 Boring machines, not boring-milling, not NC	36,333	19,147	3,160	9,453	368	1,649
41 Planing machines, NC	1,157	8	21	922	114	65
43 Planing machines, not NC	3,322	1,455	165	1,313	99	221
44 Shaping & slotting, broaching, sawing, NC	10,228	5,016	125	1,263	93	3,713
45 Shaping & slotting, not NC	7,225	1,697	982	1,330	62	1,740
46 Broaching machines, not NC	21,365	15,236	65	3,436	575	1,942
47 Sawing and cut-off machines, not NC	144,005	78,982	9,490	36,001	5,959	7,754
48 Milling machines, NC	358,039	233,753	18,125	65,506	2,517	24,631
49 Radial drilling machines, NC	2,890	295	186	1,333	72	829
51 Piercing machines, not drilling, NC	69,832	36,384	14,425	13,844	3,648	1,142
52 Milling machines, not NC	277,767	81,243	21,959	83,000	19,901	16,589
53 Radial drilling machines, not NC	11,769	2,491	956	2,673	1,269	1,772
54 Other drilling machines	61,890	21,899	7,249	14,612	3,595	6,446
55 Cylindrical and surface grinding machines (micrometric), NC	115,166	82,581	1,087	17,063	1,818	11,735
56 Grinding, honing, polishing, lapping (micrometric), NC	70,948	62,928	234	3,759	2,684	1,238
57 Surface grinding machines, plane surface (micrometric), not NC	105,756	70,727	1,494	14,974	634	8,996
58 Surface grinding machines, cylindrical surface (micrometric), not NC	83,891	50,713	2,353	5,398	1,445	16,633
59 Other grinding machines, not plane or cylindrical surface, (micrometric), not NC	117,733	32,040	7,855	49,301	16,981	8,142
61 Grinding, honing, polishing, lapping, (micrometric), not NC	145,706	119,986	2,519	10,271	1,153	8,579
62 Grinding, honing, polishing, lapping (not micrometric), NC	8,097	4,145	711	2,324	187	0
63 Grinding, honing, polishing, lapping (not micrometric), not NC	129,158	66,862	11,786	29,727	11,019	506
64 Jig boring & milling machines, NC	170,785	38,003	160	30,442	100,856	595
65 Jig boring & milling machines, not NC	6,519	3,663	249	1,584	103	623
66 Gear cutting machines, cylindrical, NC	24,378	23,057	210	548	0	563
68 Gear cutting machines, cylindrical, not NC	28,081	24,502	430	1,148	244	1,693
69 Gear cutting machines, noncylindrical, NC	4,155	3,554	0	430	0	171
71 Gear cutting machines, noncylindrical, not NC	28,506	15,885	408	4,410	6,849	835
93 Screwing and tapping machines by cutting	24,764	11,590	1,230	1,925	2,241	1,185
94 Other metal cutting machines	368,078	272,342	13,722	24,017	483	50,804
Total Imports, cutting (EEC)	$3,463,705	$2,019,989	$191,262	$545,873	$228,403	$290,326

MACHINE TOOL EXPORTS OF EEC COUNTRIES, 1986

(Thousands of U.S. Dollars)
(Continued)

Code 84.45 Item	Total EEC	West Germany	France	Italy	Benelux Countries (a)	United Kingdom
METAL FORMING						
72 Hydraulic presses, NC, other than 8445.81, 82, 88	$ 24,100	$ 6,726	$ 2,245	$ 6,736	$ 3,391	$ 3,932
75 Presses, NC, other than 8445.81, 82, 88	22,857	5,010	481	3,860	5,108	8,205
77 Hydraulic presses, not NC, other than 8445.83, 87, 89	170,060	94,360	7,224	25,171	22,941	10,485
78 Nonhydraulic presses, not NC, making rivets, bolts, screws, other than 8445.83 87, 89	46,279	28,493	122	6,714	9,788	934
79 Nonhydraulic presses, not NC, not making rivets, bolts, screws, other than 8445.83 87, 89	225,011	118,189	12,881	58,775	14,934	6,959
81 Rolling, bending, folding and planing machines, NC	43,158	16,936	4,120	5,555	6,049	5,957
82 Shearing, punching and stamping, NC	141,728	108,483	3,518	15,174	5,464	7,525
83 Rolling, bending, folding and planing machines, not NC	125,396	75,722	8,004	15,897	13,251	8,020
84 Rolling, bending, folding and planing, not flat products, not NC	74,937	24,324	11,753	17,662	9,570	5,966
85 Hydraulic shearing machines, not NC	66,069	27,112	8,563	3,726	17,393	1,950
86 Nonhydraulic shearing machines, not NC	71,479	34,490	5,301	21,787	2,445	4,132
87 Punching and stamping machines, not NC	44,381	23,177	2,113	4,167	10,255	2,328
88 Forging and stamping, NC	8,992	7,166	1	734	438	553
89 Forging and stamping, not NC	39,261	19,797	816	12,310	4,074	1,191
92 Forming by drawing, bars, tubes, wire etc.	80,750	52,457	774	20,760	587	5,313
95 Screwing and tapping machines not by cutting	16,343	8,761	1,804	3,237	612	803
96 Other metal forming machines for working flat products	51,487	40,249	3,361	5,876	935	906
97 Other machines for working wire	77,428	53,904	3,271	9,713	3,368	4,692
Total imports, forming (EEC)	$1,329,716	$ 745,356	$ 76,352	$237,854	$130,603	$ 79,851
98 MACHINE TOOLS NEC	354,150	72,607	41,205	189,195	20,097	23,286
Grand Total	$5,147,571	$2,837,952	$308,819	$972,922	$379,103	$393,463

(a) Belgium, Luxembourg, Netherlands.

Source: Statistical Office of the European Communities.

MACHINE TOOL IMPORTS OF EEC COUNTRIES, 1986

Selected Countries

(Thousands of U.S. Dollars)

Countries	Total EEC	France	Belgium	Netherlands	West Germany	Italy	United Kingdom
EUROPE	$3,045,048	$497,471	$153,636	$193,572	$ 758,676	$299,006	$332,908
France	125,061	0	11,663	6,094	45,777	16,012	12,872
Belgium	90,511	22,833	0	12,258	24,502	13,836	5,610
Netherlands	64,022	4,676	16,242	0	21,619	2,724	6,227
West Germany	1,099,809	183,201	71,410	104,728	0	127,141	164,503
Italy	423,151	120,102	17,257	13,472	134,756	0	33,765
United Kingdom	139,910	26,488	5,258	7,968	38,854	18,377	9,047
Denmark	24,327	1,592	377	1,723	8,412	546	2,310
Portugal	4,599	127	56	541	544	12	2,277
Spain	99,066	17,616	3,658	7,155	30,932	5,970	12,661
Sweden	82,822	6,549	2,396	4,800	23,529	9,051	18,548
Switzerland	646,447	91,405	13,868	22,534	338,506	72,532	45,730
Austria	78,999	4,914	600	3,484	45,308	6,507	4,805
Other Europe	34,023	1,227	4,218	946	10,234	3,139	5,416
Ireland	9,536	270	1,889	260	2,175	1,141	2,299
Norway	3,063	445	51	122	825	42	302
Finland	9,336	347	10	253	1,521	513	2,442
Yugoslavia	10,525	163	2,267	258	5,154	981	146
Eastern Europe	132,116	17,540	6,632	7,868	35,703	23,160	9,138
U.S.S.R.	20,996	1,405	1,030	745	5,601	6,418	858
East Germany	31,374	7,270	3,302	1,787	25,591(a)	7,467	3,781
Czechoslovakia	43,709	3,364	1,852	4,007	14,223	5,084	3,307
Hungary	12,898	925	122	285	7,041	749	129
AFRICA	2,599	16	553	171	766	304	606
South Africa	2,502	0	553	161	722	292	605
AMERICA	236,891	30,769	17,285	6,543	45,078	13,953	104,234
United States	199,677	30,428	16,915	6,364	40,909	12,699	74,027
Canada	31,611	259	370	161	291	502	29,673
Mexico	76	0	0	0	26	50	0
Nicaragua	162	0	0	0	0	0	0
Columbia	54	0	0	0	54	9	0
Brazil	4,811	82	0	18	3,796	348	516
Argentina	342	0	0	0	0	342	0
ASIA	781,401	86,439	109,421	25,036	244,879	31,388	120,976
Israel	2,990	39	4	4	2,316	84	120
Other Near East	1,380	69	196	22	934	102	54
India	1,830	13	60	14	1,128	20	474
Singapore	2,726	2	0	452	1,256	11	630
China	6,609	703	0	48	4,949	251	150
South Korea	7,036	493	378	237	3,848	63	1,498
Japan	706,840	77,679	106,764	20,813	216,259	28,184	107,192
Taiwan	51,230	7,434	2,020	3,445	14,070	2,641	10,681
AUSTRALIA & OCEANA	645	0	0	6	275	23	291
Australia	490	0	0	6	249	23	206
OTHER	7,055	4,939	39	0	0	1,352	0
TOTAL	$4,073,641	$619,634	$280,935	$225,328	$1,049,674	$346,025	$559,015

MACHINE TOOL IMPORTS OF EEC COUNTRIES, 1986

Selected Countries

(Thousands of U.S. Dollars)

Countries	Denmark	Portugal	Spain	Sweden	Switzerland	Austria
EUROPE	$ 95,963	$28,735	$ 83,973	$164,796	$254,131	$182,181
France	2,010	1,147	6,056	2,736	17,614	3,081
Belgium	2,454	290	1,280	3,477	3,190	1,583
Netherlands	1,287	55	438	4,185	3,860	2,711
West Germany	47,795	6,003	34,035	77,296	168,078	115,619
Italy	8,814	8,197	19,093	15,474	35,011	17,209
United Kingdom	5,287	1,658	6,755	8,693	7,019	4,506
Denmark	0	78	792	6,472	1,563	461
Portugal	235	0	466	114	186	41
Spain	2,321	7,584	0	5,612	2,928	2,629
Sweden	9,996	37	884	0	3,740	3,290
Switzerland	10,226	1,971	8,879	21,035	0	19,760
Austria	1,033	27	397	6,277	5,647	0
Other Europe	1,225	291	342	4,799	846	1,341
Ireland	813	0	31	0	404	256
Norway	41	261	26	710	236	1
Finland	114	28	75	3,836	148	48
Yugoslavia	257	1	176	253	20	848
Eastern Europe	3,279	1,397	4,555	8,441	4,450	9,952
U.S.S.R.	535	218	1,283	709	1,522	672
East Germany	516	330	1,942	1,845	380	2,754
Czechoslovakia	1,301	228	866	4,218	1,972	3,288
Hungary	525	17	3	288	496	2,318
AFRICA	0	0	9	0	175	0
South Africa	0	0	1	0	168	0
AMERICA	1,384	1,334	5,364	4,273	5,393	1,282
United States	1,384	1,254	5,036	4,066	5,325	1,267
Canada	0	77	85	158	27	7
Mexico	0	0	0	0	0	0
Nicaragua	0	0	162	0	0	0
Columbia	0	0	0	0	0	0
Brazil	0	3	0	0	41	8
Argentina	0	0	74	0	0	0
ASIA	32,790	788	16,163	45,663	53,460	14,398
Israel	0	2	186	0	233	1
Other Near East	0	0	0	0	2	0
India	0	17	0	0	124	0
Singapore	0	0	6	0	369	0
China	249	3	0	167	1	90
South Korea	408	0	0	0	103	8
Japan	29,004	458	15,622	43,037	48,684	13,144
Taiwan	3,129	309	345	2,068	3,934	1,155
AUSTRALIA & OCEANA	0	0	1	45	4	65
Australia	0	0	1	0	4	0
OTHER	720	5	0	0	0	0
TOTAL	$130,856	$30,862	$105,509	$214,776	$313,164	$197,862

(a) Since sales by the German Democratic Republic to the Federal Republic of Germany are not considered as imports, these figures are not included in totals and subtotals.

Note: Individual items may not add to totals due to rounding.

Source: CECIMO Comite Europeen de Cooperation des Industries de la Machine-Outil.

MACHINE TOOL EXPORTS OF EEC COUNTRIES, 1986

Selected Countries

(Thousands of U.S. Dollars)

Countries	Total EEC	France	Belgium	Netherlands	West Germany	Italy	United Kingdom
EUROPE	$4,403,883	$175,001	$192,437	$80,815	$1,908,101	$607,606	$175,419
France	543,334	0	51,807	6,550	214,851	118,438	27,578
Belgium	162,077	13,225	0	16,810	81,511	21,732	7,622
Netherlands	197,998	5,334	12,505	0	118,412	15,038	10,192
West Germany	767,884	39,283	67,048	25,063	0	139,482	44,941
Italy	280,468	19,055	12,580	3,027	135,498	0	15,949
United Kingdom	363,112	16,656	17,024	7,961	187,248	42,614	0
Denmark	92,539	1,337	3,132	1,316	47,109	8,328	4,548
Portugal	30,659	2,045	493	142	7,450	9,413	1,222
Spain	79,466	6,376	1,077	968	31,448	19,849	6,060
Sweden	186,252	3,897	3,657	4,512	99,784	19,029	10,650
Switzerland	279,007	18,041	2,053	4,366	187,691	41,458	10,531
Austria	222,500	3,174	1,778	2,186	166,759	18,469	2,627
Other Europe	338,497	12,983	6,685	2,268	166,844	52,683	24,240
Norway	59,276	3,988	2,332	630	28,793	3,173	3,015
Finland	64,488	3,491	1,021	767	25,076	9,057	4,762
Yugoslavia	103,963	644	187	14	68,293	13,596	1,419
Turkey	64,094	3,840	1,012	43	30,137	14,269	4,288
Eastern Europe	858,244	33,596	12,597	5,647	463,496	101,073	9,258
U.S.S.R.	511,618	5,509	5,339	2,936	316,290	72,977	3,184
East Germany	39,575	21,662	2,338	63	45,658(a)	1,190	1,455
Poland	61,302	998	970	557	29,357	10,460	1,062
Czechoslovakia	90,181	3,689	1,218	1,126	46,160	3,902	2,117
Bulgaria	119,103	1,601	2,545	875	58,918	10,199	1,163
AFRICA	250,580	50,346	35,285	2,901	55,388	52,767	16,684
South Africa	25,478	862	686	410	10,103	3,664	4,219
AMERICA	1,217,162	52,173	15,690	15,294	565,198	187,970	116,744
United States	886,994	41,137	7,876	14,233	410,082	129,239	94,579
Canada	158,345	6,665	6,526	417	75,439	28,556	17,187
Mexico	45,799	866	48	62	27,629	5,429	1,483
Colombia	9,100	188	141	13	1,996	1,236	387
Venezuela	18,158	464	23	95	5,053	7,027	797
Brazil	50,136	329	205	0	31,290	6,528	948
Argentina	18,817	125	307	81	9,448	4,523	0
ASIA	997,115	24,467	18,188	13,764	513,094	111,693	71,648
Iran	53,328	1	948	2	31,158	7,659	2,749
Israel	38,153	2,065	1,593	153	14,293	8,072	3,967
India	109,161	2,820	1,788	1,366	59,534	8,338	12,999
China	361,847	5,856	7,047	4,877	204,179	47,602	18,186
South Korea	69,932	531	749	342	45,926	3,502	4,233
Japan	175,793	1,528	1,936	2,733	87,307	8,902	4,323
Taiwan	22,670	1,425	317	844	12,095	752	1,118
OCEANA & AUSTRALIA	77,678	6,900	1,085	1,483	32,665	7,364	14,329
Australia	65,585	5,761	1,068	1,473	28,551	6,050	11,648
OTHER	6,268	0	12	11	0	82	0
TOTAL	6,952,687	308,888	262,698	114,269	3,074,445	967,482	394,825

MACHINE TOOL EXPORTS OF EEC COUNTRIES, 1986

Selected Countries

(Thousands of U.S. Dollars)

Countries	Denmark	Portugal	Spain	Sweden	Switzerland	Austria
EUROPE	$32,838	$4,379	$110,387	$110,481	$ 882,608	$123,810
France	2,090	101	17,223	5,298	94,467	4,932
Belgium	599	31	3,968	2,135	13,792	654
Netherlands	1,911	206	7,468	4,258	19,800	2,872
West Germany	8,146	333	31,833	24,999	342,791	43,966
Italy	170	6	6,517	9,942	72,970	4,753
United Kingdom	3,942	2,729	12,581	19,825	48,821	3,709
Denmark	0	243	2,901	12,275	10,663	687
Portugal	96	0	7,279	451	2,035	32
Spain	460	484	0	487	11,828	429
Sweden	7,477	101	5,554	0	26,376	5,217
Switzerland	1,768	116	3,060	3,390	0	6,532
Austria	500	11	2,563	3,217	21,218	0
Other Europe	5,195	20	8,904	17,192	37,281	4,201
Norway	3,159	0	1,607	8,849	3,066	664
Finland	1,005	0	3,599	6,933	8,230	547
Yugoslavia	50	0	936	1,410	15,777	1,638
Turkey	306	0	1,173	0	7,978	1,048
Eastern Europe	484	0	536	5,166	180,566	45,826
U.S.S.R.	140	0	442	728	84,910	19,163
East Germany	62	0	0	232	12,537	35
Poland	103	0	40	3,461	12,552	1,742
Czechoslovakia	34	0	38	170	24,509	7,218
Bulgaria	0	0	0	455	42,373	973
AFRICA	4,436	528	8,182	2,100	16,444	5,519
South Africa	143	56	1,284	0	3,714	338
AMERICA	6,357	2,199	44,102	24,856	171,898	14,681
United States	3,661	1,796	20,719	20,851	134,419	8,402
Canada	534	242	3,900	2,876	14,120	1,882
Mexico	381	10	4,066	0	5,385	440
Colombia	334	0	3,692	0	870	243
Venezuela	275	34	3,400	0	841	150
Brazil	319	44	470	0	9,941	62
Argentina	46	54	1,068	0	3,085	79
ASIA	5,838	269	12,216	15,574	180,525	29,839
Iran	553	0	520	0	9,158	579
Israel	204	64	1,558	0	6,015	169
India	646	0	1,546	0	19,485	645
China	977	0	2,201	7,098	51,768	12,056
South Korea	660	0	11	0	13,480	498
Japan	400	0	53	970	53,977	13,664
Taiwan	140	0	129	121	5,574	155
OCEANA & AUSTRALIA	406	31	3,274	1,195	8,437	508
Australia	406	31	2,801	0	7,396	400
OTHER	6,158	0	0	0	0	5
TOTAL	56,034	7,406	178,162	154,205	1,259,912	174,362

(a) Since sales by the German Democratic Republic to the Federal Republic of Germany are not considered as imports, these figures are not included in totals and subtotals.

Note: Individual items may not add to totals due to rounding.

Source: CECIMO Comite Europeen de Cooperation des Industries de la Machine-Outil.

MACHINE TOOL IMPORTS AS A PERCENT OF DOMESTIC MACHINE TOOL CONSUMPTION, 1969 TO DATE

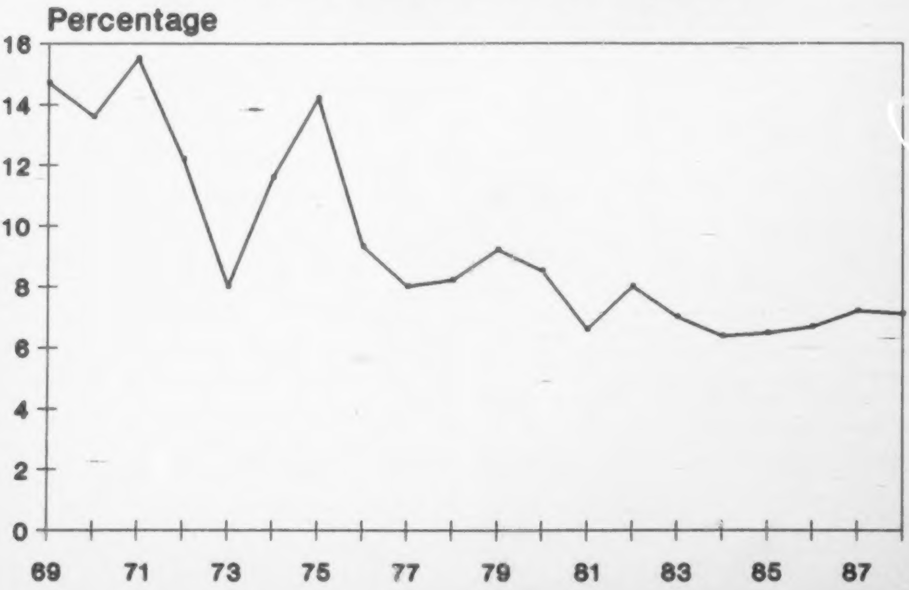
(Percent)

Year	U.S.A.	Japan	United Kingdom	West Germany
1969	9.7%	14.7%	26.0%	22.9%
1970	9.5	13.6	28.9	23.8
1971	10.1	15.5	30.6	20.6
1972	10.0	12.2	33.3	22.1
1973	10.3	8.0	34.9	21.3
1974	13.4	11.6	40.2	23.7
1975	14.5	14.2	41.7	27.8
1976	16.1	9.3	44.8	27.7
1977	16.5	8.0	39.7	30.0
1978	21.5	8.2	42.4	29.9
1979	23.3	9.2	46.5	29.8
1980	23.6	8.5	47.1	32.8
1981(r)	25.6	6.6	58.2	28.4
1982(r)	27.4	8.0	53.4	25.4
1983(r)	34.0	7.0	48.8	26.7
1984(r)	39.1	6.4	48.3	32.5
1985(r)	42.5	6.5	47.2	30.1
1986(r)	50.2	6.7	52.4	30.7
1987(r)	48.7	7.3	48.8	31.3
1988(p)	50.1	7.1	51.0	29.6

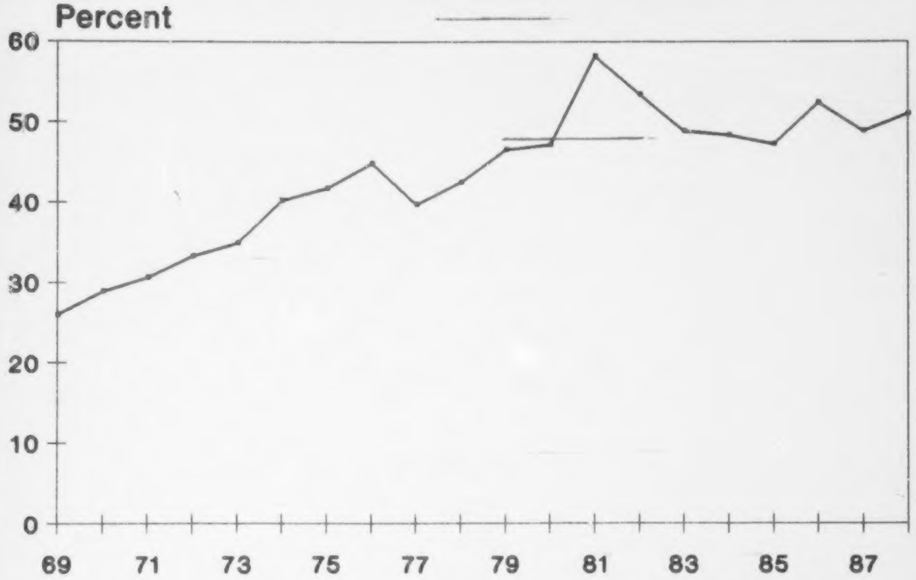
p - Preliminary.   r - Revised.

Source: NMTBA and respective machine tool trade associations.

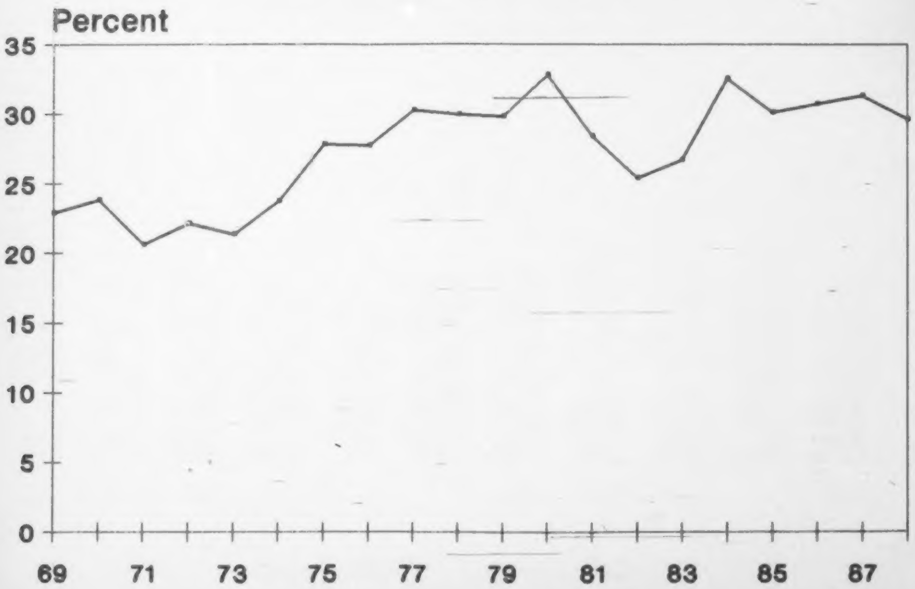
Japanese Machine Tool Imports
% of Domestic Consumption



U. K. Machine Tool Imports
% of Domestic Consumption



German Machine Tool Imports
% of Domestic Consumption



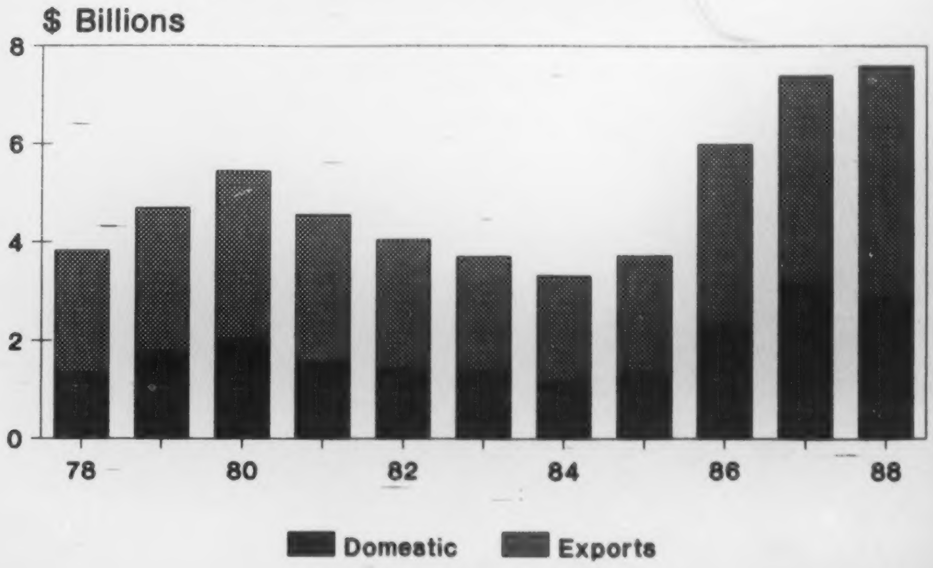
THE GERMAN MACHINE TOOL INDUSTRY (a)
1971 to Date

Year	Employees (Year-End)	Per Cent of Production Exported	Imports as Per Cent of Exports	Production Per Employee
		Per Cent of Value		U.S. $
1971	122,500	49.3	26.7	15,056
1972	117,600	55.7	21.2	15,275
1973	115,500	61.3	15.8	18,815
1974	115,800	69.0	12.8	22,541
1975	109,300	72.7	13.0	25,171
1976	101,400	70.2	9.5	27,283
1977	95,900	69.7	18.7	31,857
1978	94,800	65.0	22.9	40,326
1979	95,000	61.9	26.1	49,378
1980	98,000	62.6	29.2	55,497
1981	97,000	65.6	26.0	46,858
1982	93,000	64.2	24.1	43,377
1983	83,700	62.0	25.7	43,989
1984	83,000	64.1	28.2	39,825
1985	88,000	62.4	33.9	42,185
1986	93,000	60.6	36.8	64,445
1987	93,500	57.6	37.0	78,976
1988	94,000	61.9	34.2	80,694

(a) Figures include parts.

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

West Germany
Machine Tool Production



GERMAN PRODUCTION OF MACHINE TOOLS

1985 to Date

(Values in Thousands of U.S. Dollars)

Machine Classifications	1985		1986		1987		1988	
	Units	Value	Units	Value	Units	Value	Units	Value
GRAND TOTAL	165,750	$3,712,242	124,884	$5,993,406	126,150	$7,384,244	129,841	$7,585,280
Metal Cutting Total	98,286	$2,594,486	82,354	$4,275,026	78,519	$5,306,989	80,492	$5,410,525
Planing, Shaping and Broaching	397	21,444	404	27,034	273	27,434	252	36,457
Lathes	6.367	239,838	6,892	377,892	6,723	424,738	7,367	452,657
Turret Lathes, Automatic Boring and Drilling	2,786 13,380	285,446 89,403	3,274 15,212	467,116 139,058	2,738 16,633	642,193 152,677	2,436 14,980	618,426 154,968
Milling Machines, Horizontal Boring and Milling Machines	8,080	407,821	8,883	652,990	8,233	724,039	7,648	775,446
Saws and Filing Machines	14,284	72,681	11,446	112,209	8,856	120,650	7,686	142,323
Grinding, Honing and Polishing	35,602	408,238	16,338	668,729	16,989	850,080	19,965	827,288
Gear Cutting Machines	923	106,252	1,133	185,960	1,040	233,120	964	230,795
Other Metal Cutting Machine Tools	16,467	607,156	18,772	1,112,675	17,024	1,477,648	19,194	1,490,430
Parts and Accessories	—	356,208	—	531,364	—	654,410	—	681,734
Metal Forming Total	67,464	1,117,755	42,530	1,718,379	47,631	2,077,255	49,349	2,174,755
Hammers, Forging and Riveting Machines, Bending and Straightening Machines	3.564	108,409	4,079	151,562	3,861	210,699	3,794	205,316
Mechanical Presses	11.307	159,361	13,841	267,118	11,342	335,481	11,654	306,992
Hydraulic Presses	1,979	149,927	2,165	255,471	1,931	276,618	2,334	296,923
Sheet Metalworking Machines, Including Shears	42,498	305,475	14,509	467,872	13,998	541,846	14,583	612,702
Wire Working Machines	7,720	174,372	7,526	242,546	15,991	306,937	16,577	324,480
Bolt, Screw and Nut Making Machines	396	32.591	410	57,121	537	78,254	407	96,955
Parts and Accessories	—	187,620	—	276,690	—	327,420	—	331,387

Notes: German Federal Republic includes West Berlin. Totals include some unclassified items.

Individual items may not add to totals due to rounding.

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

Detailed statistics supplied by individual countries may differ in value figures from those given in the International Statistics on Machine Tools. Problems in the conversion of national currencies into dollars and differing reporting practices probably account for most of the discrepancies.

GERMAN EXPORTS OF MACHINE TOOLS

1985 to Date

(Thousands of U.S. Dollars)

Machine Classifications	1985 Units	1985 Value	1986 Units	1986 Value	1987 Units	1987 Value	1988 Units	1988 Value
GRAND TOTAL	189,934	$2,315,393	86,936	$3,633,776	82,539	$4,251,586	156,113	$4,692,619
Metal Cutting Total	159,505	$1,416,448	55,422	$2,282,723	51,260	$2,647,094	111,309	$2,976,304
Planing, Shaping and Broaching	288	8,812	365	18,324	301	13,577	322	23,029
Lathes	3,175	144,116	2,921	204,210	3,055	272,992	2,689	236,934
Turret Lathes, Automatic	2,621	164,917	2,528	249,031	2,407	269,401	2,909	392,343
Drilling	12,206	68,006	10,208	139,878	12,150	157,726	14,283	78,312
Milling Machines, Horizontal Boring and Milling Machines	6,262	249,830	7,328	430,460	6,726	430,048	6,057	433,060
Saws and Filing Machines	9,862	57,065	8,985	83,628	7,799	82,296	11,302	118,559
Grinding, Honing and Polishing	119,573	299,407	17,550	488,128	13,680	581,699	65,199	567,582
Gear Cutting Machines	545	44,565	554	66,744	587	90,465	755	120,318
Other Metal Cutting Machine Tools	4,973	196,599	4,983	331,144	4,555	427,217	7,793	661,719
Parts and Accessories	—	183,132	—	271,156	—	321,672	—	344,449
Metal Forming Total	27,927	735,132	28,218	1,100,667	28,227	1,256,212	44,804	1,400,269
Hammers, Forging and Riveting Machines								
Bending and Straightening Machines	3,129	76,539	2,917	57,091	2,783	108,072	11,032	149,675
Mechanical Presses	4,067	56,263	4,680	122,465	6,104	133,195	4,065	111,039
Hydraulic Presses	1,828	57,732	1,387	96,262	970	98,842	2,222	152,983
Sheet Metalworking Machines, Including Shears	8,493	187,703	9,083	286,658	8,908	285,686	19,698	361,176
Wire Working Machines	5,318	124,056	5,759	193,020	4,907	199,067	3,818	179,232
Bolt, Screw and Nut Making Machines	551	29,302	536	41,552	461	51,309	495	50,523
Other Metal Forming Machine Tools	4,541	41,723	3,856	72,306	4,094	104,573	3,474	117,481
Parts and Accessories	—	161,814	—	231,314	—	275,470	—	278,158
Other Metal Working Machines (including Parts and Accessories)(a)	2,502	163,813	3,296	250,386	3,052	348,280	—	316,046

(a) Includes nuclear materials handling machines, presses for treating metals, and industrial plant components.

Note: Individual items may not add to totals due to rounding.

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

GERMAN IMPORTS OF MACHINE TOOLS
1985 to Date
(Thousands of U.S. Dollars)

Machine Classifications	1985		1986		1987		1988	
	Units	Value	Units	Value	Units	Value	Units	Value
GRAND TOTAL	83,345	$785,007	69,292	$1,337,104	66,360	$1,571,812	423,012	$1,606,942
Metal Cutting Total	64,891	$516,495	49,669	$905,935	45,575	1,042,325	388,783	$1,156,515
Planing, Shaping and Broaching	126	1,513	156	1,749	98	2,852	90	2,706
Lathes	7,245	65,380	9,322	116,653	7,625	116,093	6,399	110,879
Turret Lathes, Automatic	1,336	46,987	1,905	88,253	1,876	101,699	3,230	113,161
Drilling	6,926	67,893	9,145	125,914	12,012	119,337	176,291	36,575
Milling Machines, Horizontal Boring and Milling Machines	4,640	98,721	7,003	182,235	6,389	184,608	8,170	165,504
Saws and Filing Machines	6,716	12,630	9,646	20,012	8,678	21,408	11,229	22,355
Grinding, Honing and Polishing	35,282	84,356	9,379	141,954	5,816	211,526	177,956	193,236
Gear Cutting Machines	81	7,838	75	9,637	80	17,365	134	24,802
Other Metal Cutting Machine Tools	2,539	55,032	3,038	92,197	3,001	116,175	5,284	270,084
Parts and Accessories	—	76,145	—	127,332	—	151,261	—	219,213
Metal Forming Total	16,079	218,872	16,776	364,406	17,360	450,148	34,319	421,032
Hammers, Forging and Riveting Machines, Bending and Straightening Machines	1,944	7,687	1,644	13,339	2,005	19,110	5,182	52,571
Mechanical Presses	1,455	12,342	2,146	21,639	2,085	26,563	1,893	24,267
Hydraulic Presses	1,452	15,295	1,260	26,924	1,463	35,791	1,846	26,790
Sheet Metalworking Machines, Including Shears	4,652	49,603	5,245	77,756	6,122	92,597	19,600	103,591
Wire Working Machines	2,840	35,050	2,802	51,600	2,683	59,597	2,484	53,402
Bolt, Screw and Nut Making Machines	309	9,145	465	25,365	309	15,270	330	19,048
Other Metal Forming Machine Tools	3,427	16,656	3,214	26,071	2,693	34,447	2,984	20,579
Parts and Accessories	—	73,095	—	121,713	—	166,774	—	120,784
Other Metal Working Machines (including Parts and Accessories)(a)	2,375	49,640	2,847	66,763	3,425	79,339	—	27,395

(a) Includes nuclear materials handling machines, presses for treating metals, and industrial plant components.

Note: Individual items may not add to totals due to rounding.

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

GERMAN EXPORTS OF METAL CUTTING MACHINE TOOLS
By Type of Machine & By Destination, 1988
(Thousands of Dollars)

Destination	Total (a)	Drilling Machines	Gear Cutting	Grinding Honing, Polishing	Turret Lathes, Automatic	All Other Lathes	Boring & Milling Machines	Saw & Filling Machines	Planing, Slotting & Broaching	Other Metal Cutting
EUROPE	$1,875,553	$61,951	$ 83,152	$354,484	$300,182	$156,828	$298,579	$ 87,743	$17,387	$515,245
EEC	850,634	22,195	46,766	152,224	139,638	65,684	127,353	54,352	10,549	231,872
France	262,455	8,733	13,451	43,493	50,546	17,216	30,789	15,992	7,221	75,014
Belgium-Luxembourg	73,468	3,466	6,221	11,287	7,756	6,080	10,653	3,997	855	23,153
Netherlands	69,927	2,692	474	13,296	7,586	9,601	11,978	7,242	279	16,779
Italy	174,466	2,044	9,659	32,288	32,896	11,973	30,347	10,547	282	44,429
United Kingdom	178,282	1,722	13,484	29,773	29,807	1,867	30,968	10,402	1,011	49,248
Ireland	2,282	107	0	1,240	325	212	34	166	0	198
Denmark	28,447	849	469	6,306	3,623	1,953	4,960	1,896	687	7,706
Greece	5,024	39	706	799	190	368	770	294	8	1,849
Portugal	9,773	379	66	4,070	543	977	2,277	431	94	937
Spain	46,510	2,163	2,236	9,674	6,367	5,438	4,580	3,384	111	12,558
Other Europe	1,024,919	39,757	36,386	202,260	160,544	91,144	171,226	33,391	6,838	283,373
Norway	10,793	214	2	2,265	2,179	1,434	2,397	1,144	34	1,104
Sweden	93,600	1,466	5,043	19,727	14,227	10,133	10,963	6,186	1,405	24,449
Switzerland	157,156	3,965	3,521	29,637	25,183	11,926	30,163	8,886	405	43,471
Austria	200,329	4,645	3,686	26,791	14,806	10,186	37,630	5,809	2,916	93,861
Yugoslavia	41,996	1,326	3,984	10,575	5,613	2,648	9,917	251	1,573	6,111
Soviet Union	362,299	19,973	11,673	67,199	83,088	41,723	60,620	4,289	0	73,733
Poland	32,502	1,310	407	7,557	3,703	2,335	2,046	1,375	136	13,632
Czechoslovakia	37,095	569	3,090	9,159	2,573	4,557	3,197	2,857	288	10,806
Hungary	13,133	273	235	3,571	247	2,811	2,488	247	0	3,262
Romania	9	0	0	0	9	0	0	0	0	0
Bulgaria	40,010	4,186	2,227	14,867	2,216	1,635	7,541	81	0	7,257
Other Europe	35,997	1,830	2,518	10,892	6,699	1,757	4,265	2,267	81	5,688
AFRICA	25,908	2,115	1,375	3,807	3,019	6,202	5,178	1,004	67	3,139
Algeria	4,626	5	325	892	1,212	0	904	66	0	1,222
South Africa	13,392	727	1,036	1,274	1,671	5,008	2,081	445	8	1,143
Other Africa	7,669	1,384	15	1,642	137	1,194	2,193	491	59	774
AMERICAS	324,850	7,278	17,232	95,327	32,923	14,723	45,296	13,909	1,433	96,729
United States	222,345	4,890	14,319	65,291	15,610	4,988	30,639	6,360	270	79,977
Canada	28,039	798	222	7,085	4,344	3,129	3,274	4,406	183	4,599
Mexico	20,480	221	0	5,267	3,692	2,034	864	179	9	8,215
Venezuela	5,246	3	0	421	349	633	1,468	2,069	0	303
Brazil	38,099	184	2,177	15,813	7,671	3,154	5,505	575	778	2,242
Argentina	4,903	773	501	624	963	31	1,510	170	32	298
Other Americas	5,738	410	13	826	294	753	2,036	151	160	1,095
ASIA	393,706	6,243	18,391	109,666	54,778	59,088	83,225	13,858	4,142	44,315
Iraq	59,305	1,171	0	3,219	6,745	22,562	18,141	4,538	1,109	1,820
Iran	92,142	1,033	1,941	14,162	17,846	18,883	23,931	2,247	1,910	10,187
Israel	2,073	101	3	605	481	90	290	194	0	309
Saudi Arabia	1,355	24	122	263	0	473	435	31	0	7
India	44,900	1,878	1,158	11,521	13,442	3,677	10,118	1,464	28	1,613
Thailand	3,817	62	76	381	247	2,035	689	56	27	244
Indonesia	4,343	458	0	934	0	1,121	702	284	326	518
Singapore	5,559	91	0	1,384	306	216	1,574	438	0	1,548
China	55,556	134	6,856	18,752	2,837	5,572	12,857	587	565	7,395
Korea, South	63,915	715	5,001	29,387	4,567	504	8,354	357	0	15,030
Japan	35,819	74	2,943	20,251	3,667	2,054	2,086	2,811	0	1,933
Taiwan	10,006	169	206	5,971	753	1,082	427	147	0	1,251
Other Asia	14,916	331	85	2,835	3,887	815	3,620	706	177	2,460
AUSTRALIA & OCEANIA	11,839	724	168	4,298	1,440	93	782	2,044	0	2,290
Australia	11,511	712	150	4,139	1,440	87	730	1,962	0	2,290
Other Oceania	328	11	18	159	0	6	52	82	0	0
WORLD	2,631,855	78,312	120,318	567,582	392,343	236,934	433,060	118,559	23,029	661,719

(a) Excludes parts.

Note: Indivdual items may not add to totals due to rounding.

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

GERMAN EXPORTS OF METAL FORMING MACHINE TOOLS

By Type of Machine & By Destination, 1988

(Thousands of U.S. Dollars)

Country of Destination	Total(a)	Hammers, Forging & Riveting, Blending & Forming	Mechan-ical Prssses	Hydrau-lic Presses	Sheet Metal-working Including Shears	Wire Working Machines	Bolt, Screw & Nut Working	Other Metal Forming Machines
EUROPE	$ 760,182	$103,368	$ 61,794	$ 87,829	$277,737	$108,869	$44,175	$ 76,409
EEC	399,409	55,312	31,482	40,716	153,196	65,609	15,424	37,671
France	83,281	9,837	3,566	7,175	41,947	10,618	3,328	6,810
Belgium-Luxembourg	42,922	7,370	4,299	4,683	13,058	10,120	168	3,223
Netherlands	44,520	4,068	5,452	7,043	21,160	4,359	810	1,626
Italy	96,200	15,826	6,291	12,878	32,701	12,487	6,274	9,744
United Kingdom	69,228	10,941	6,482	2,741	21,352	11,390	3,442	12,880
Ireland	4,005	188	229	533	1,798	818	81	357
Denmark	13,839	1,287	1,167	727	9,153	1,278	43	184
Greece	4,148	601	49	144	735	2,434	26	159
Potugal	10,589	542	459	3,032	2,048	3,357	99	1,053
Spain	30,677	4,651	3,487	1,761	9,242	8,748	1,154	1,634
OTHER EUROPE	360,773	48,056	30,312	47,114	124,452	43,260	28,751	38,738
Norway	9,254	1,602	219	96	4,483	2,528	162	163
Sweden	51,038	8,903	12,969	322	9,591	2,530	754	15,969
Switzerland	55,673	1,020	3,108	7,660	29,851	8,940	1,108	3,986
Austria	52,205	9,550	4,371	4,876	24,235	4,611	583	3,980
Yugoslavia	16,432	2,231	2,050	4,528	2,973	2,993	46	1,189
Soviet Union	84,439	12,520	1,545	19,341	21,848	4,034	20,600	4,551
Poland	18,393	676	2,195	182	5,493	5,791	3,177	880
Czechoslovakia	15,121	1,170	877	607	8,971	804	7	2,685
Hungary	4,825	1,096	256	14	1342	696	967	454
Romania	772	772	0	0	0	0	0	0
Bulgaria	21,393	53	321	8,592	5,783	2,511	3	4,131
Other Europe	31,228	8,464	2,401	896	9,972	7,821	923	750
AFRICA	24,555	1,298	4,184	2,805	7,975	7,189	313	791
Algeria	4,349	108	2,258	1,059	95	383	0	446
South Africa	8,923	472	1,589	145	3,805	2,384	303	224
Other Africa	11,283	718	337	1,602	4,074	4,421	10	121
AMERICAS	97,901	19,067	12,093	7,342	28,542	21,692	1,627	7,537
United States	58,036	10,523	7,829	3,869	21,444	8,884	387	5,101
Canada	9,583	1,925	908	1,668	3,131	1,352	81	518
Mexico	3,535	557	352	237	799	860	219	490
Venezuela	7,150	353	403	407	354	5,617	0	16
Brazil	9,379	1,801	1,509	891	1,707	2,504	700	268
Argentina	6,584	3,747	338	0	359	1,315	86	739
Other Americas	3,635	141	753	272	747	1,161	154	407
ASIA	230,571	23,525	32,913	54,883	43,483	39,223	4,002	32,544
Iraq	35,124	306	8,949	12,698	2,388	181	50	10,552
Iran	44,822	1,713	7,789	20,222	4,838	1,751	442	8,066
Israel	8,329	2,156	1,770	0	526	2,045	8	1,825
Saudi Arabia	3,640	82	349	16	472	2,542	0	178
India	19,946	1,153	1,341	8,888	1,391	1,811	439	4,924
Thailand	3,332	339	662	67	1,577	411	23	253
Indonesia	5,017	1,925	1,580	15	916	413	0	169
Singapore	2,489	502	316	69	366	934	42	260
China	44,786	8,144	4,500	6,21	11,448	9,755	1,614	3,114
Korea, South	18,451	2,813	2,513	3,548	2,339	5,695	782	761
Japan	18,729	961	1,023	2,135	9,379	3,500	214	1,516
Taiwan	16,665	2,048	1,033	261	4,825	7,809	0	690
Other Asia	9,241	1,382	1,088	753	3,018	2,376	388	236
AUSTRALIA & OCEANIA	8,903	2,417	56	124	3,440	2,260	405	200
Australia	7,571	2,385	26	121	2,283	2,154	402	200
Other Oceania	1,332	32	30	3	1,157	106	3	0
WORLD	1,122,111	149,675	111,040	152,983	361,176	179,232	50,523	117,481

(a) Excludes parts.

Note: Individual items may not add to totals due to rounding.

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

GERMAN IMPORTS OF METAL CUTTING MACHINE TOOLS

By Type of Machine & By Destination, 1988

(Thousands of Dollars)

Destination	Total (a)	Drilling Machines	Gear Cutting	Grinding Honing, Polishing	Turret Lathes, Automatic	All Other Lathes	Boring & Milling Machines	Saw & Filing Machines	Planing, Slotting & Broaching	Other Metal Cutting
WORLD	$939,302	$36,575	$24,802	$193,237	$113,161	$110,879	$165,504	$22,355	$2,706	$270,084
EUROPE	641,117	18,529	22,124	169,600	58,682	63,459	140,231	19,276	2,634	146,581
France	23,526	609	284	2,218	1,621	4,890	7,110	1,777	306	4,711
Belgium-Luxembourg	8,195	157	0	491	296	4,391	1,140	574	41	1,105
Netherlands	20,687	958	39	6,039	865	1,568	1,941	752	40	8,484
Italy	95,151	3,600	821	28,037	12,157	9,299	20,168	10,043	1,430	9,595
United Kingdom	56,754	1,035	227	14,207	6,694	7,884	8,250	706	24	17,727
Denmark	4,948	482	30	2,447	586	290	467	136	46	465
Spain	30,077	1,565	0	1,812	2,363	2,585	12,908	974	128	7,742
Sweden	27,698	494	0	18,584	3,501	1,815	1,532	197	7	1,568
Switzerland	289,928	7,140	20,523	78,990	18,453	10,094	68,387	2,111	505	83,724
Austria	47,408	421	6	12,180	9,583	12,616	5,145	1,237	6	6,214
Yugoslavia	4,620	503	177	1,156	192	688	1,537	242	0	123
Soviet Union	5,841	365	0	1,269	442	773	2,464	0	101	387
Poland	3,623	64	0	150	0	1,949	1,446	0	0	14
Czechoslovakia	9,212	421	5	708	803	1,696	5,499	0	0	78
Hungary	5,605	180	4	322	77	883	535	6	0	3,598
Romania	1,370	59	0	751	35	69	455	0	0	0
Other	6,474	453	9	218	1,012	1,969	1,246	519	0	1,047
United States	30,235	217	2,596	9,389	612	1,430	1,676	518	0	13,796
Israel	46	0	0	36	0	0	0	1	0	10
Singapore	1,959	0	0	1,887	0	0	48	0	0	24
China	10,243	1,553	0	1,375	1,118	3,033	2,525	3	0	637
Korea, South	3,572	158	10	0	0	2,356	63	0	0	986
Japan	217,531	5,100	0	4,530	50,205	35,559	17,791	2,048	0	102,298
Taiwan	29,668	10,763	0	5,878	1,740	3,030	2,862	478	0	4,917
Other Countries	4,931	256	72	542	804	2,011	307	31	72	835

(a) Excludes parts.

Note: Individual items may not add to totals due to rounding.

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

GERMAN IMPORTS OF METAL FORMING MACHINE TOOLS

By Type of Machine & By Destination, 1988

(Thousands of U.S. Dollars)

Origin	Total (a)	Hammers, Forging & Riveting, Bending & Forming	Mechanical Presses	Hydraulic Presses	Sheet Metalworking Including Shears	Wire Working Machines	Bolt, Screw & Nut Working	Other Metal Forming Machines
WORLD	$300,248	$52,571	$24,267	26,790	$103,591	$53,402	$19,048	$20,579
EUROPE	236,904	45,969	18,978	21,146	82,877	36,904	11,217	19,813
France	22,126	4,874	1,064	3,628	6,161	2,041	491	3,846
Belgium-Luxembourg	20,937	3,129	1,375	1,032	13,060	491	1,355	494
Netherlands	14,747	2,720	1,634	1,471	70,070	863	18	971
Italy	47,489	7,075	5,637	5,131	10,950	5,441	5,002	8,252
United Kingdom	13,001	5,646	1,890	575	2,082	1,815	346	647
Denmark	8,889	3,024	347	610	3,677	1,072	9	150
Spain	11,505	1,175	203	13	3,033	6,094	858	129
Sweden	6,111	1,163	644	1,376	1,847	1,077	75	127
Switzerland	67,970	11,720	2,887	4,124	28,754	13,934	2,874	3,587
Austria	12,109	3,455	720	1,756	2,974	1,763	133	1,307
Yugoslavia	802	63	622	40	35	13	0	29
Soviet Union	975	0	800	46	91	0	0	38
Poland	16	0	0	0	4	12	0	0
Czechoslovakia	1,918	278	810	327	466	36	0	0
Hungary	1,730	317	153	0	859	398	0	3
Romania	629	47	0	579	3	0	0	0
Other	5,950	1,281	173	346	2,013	1,852	55	230
United States	31,814	2,228	5,032	5,228	11,263	2,971	4,927	166
Israel	2,238	85	0	0	1,111	907	40	94
Singapore	652	0	0	0	153	32	467	0
China	81	79	0	0	0	2	0	0
Korea, South	18	0	0	0	18	0	0	0
Japan	27,043	3,828	181	359	7,578	12,496	2,229	374
Taiwan	552	206	9	0	276	6	54	1
Other Countries	947	177	66	58	317	84	114	132

(a) Excludes parts.

Note: Individual items may not add to totals due to rounding.

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

JAPANESE PRODUCTION, IMPORTS, EXPORTS, AND DOMESTIC CONSUMPTION OF METAL CUTTING MACHINE TOOLS, 1969 to Date

(Millions of U.S. Dollars)

Year	Production	Imports	Exports	Domestic Consumption
1969	666.6	95.8	60.4	702.0
1970	867.6	122.7	66.9	923.4
1971	755.4	113.6	80.1	788.9
1972	679.4	74.1	90.8	662.7
1973	1,120.1	78.3	129.3	1,069.1
1974	1,230.2	127.6	197.8	1,160.0
1975	777.4	72.7	207.6	642.5
1976	770.9	46.8	256.5	561.2
1977	1,165.1	58.5	430.1	793.5
1978	1,736.7	93.3	770.4	1,059.6
1979	2,208.9	119.6	942.8	1,385.7
1980	3,008.2	168.6	1,188.9	1,987.9
19[illegible]	3,860.3	175.1	1,409.2	2,626.2
1982	3,143.0	175.0	994.1	2,323.9
1983	2,956.7	136.9	999.7	2,093.9
1984	3,711.2	123.2	1,319.9	2,514.5
1985	4,406.5	147.5	1,656.1	2,897.9
1986	5,337.1	197.3	2,157.6	3,376.8
1987	4,762.0	152.6	2,049.0	2,865.6
1988	6,875.3	286.6	2,508.7	4,653.2

Sources: Japan, Ministry of International Trade and Industry and Ministry of Finance.

JAPANESE PRODUCTION, IMPORTS, AND EXPORTS OF METAL FORMING MACHINE TOOLS, 1969 to Date

(Values in Millions of U.S. Dollars)

	Production		Total Exports	Total Imports
Year	Units	Value	Value	
1969	23,033	$ 195.8	$ 16.3	$ 39.4
1970	26,345	241.5	24.3	37.5
1971	16,466	202.0	34.3	40.6
1972	19,720	216.3	54.9	29.2
1973	27,168	360.1	86.4	31.6
1974	23,854	420.0	109.8	46.6
1975	12,447	284.8	105.6	51.3
1976	15,978	294.6	113.4	24.1
1977	16,326	438.0	186.0	27.5
1978	18,526	613.7	241.1	26.8
1979	23,995	687.1	286.6	45.0
1980	28,598	818.0	264.0	52.5
1981	27,961	936.8	276.3	40.4
1982	20,443	653.3	269.3	45.3
1983	21,895	588.2	254.3	34.1
1984	31,719	761.7	419.3	58.4
1985	28,110	910.2	522.9	71.5
1986	22,892	1,535.5	905.8	75.0
1987	22,103	1,620.6	985.8	111.7
1988	29,639	1,809.9	919.3	110.5

Source: Japan Metal Forming Machinery Builders' Association.

JAPANESE EMPLOYMENT IN THE METAL CUTTING MACHINE TOOL INDUSTRY

Number of Employees, 1965 to Date

Year	Employees	Year	Employees
1969	44,806	1979	31,113
1970	49,161	1980	33,737
1971	50,630	1981	33,420
1972	46,738	1982	34,204
1973	45,242	1983	33,705
1974	45,295	1984	33,628
1975	40,925	1985	34,644
1976	34,509	1986	35,306
1977	32,168	1987	32,705
1978	28,154	1988	32,864

Source: Japan, Ministry of International Trade and Industry.

JAPANESE PRODUCTION, EXPORTS, AND IMPORTS OF METAL FORMING MACHINE TOOLS

By Type of Machine, 1987 and 1988

(Values in Thousands of U.S, Dollars)

	1987			1988		
Type of Machine	Production(r)	Exports	Imports	Production	Exports	Imports
Total						
Units	22,103	33,848	5,135	29,639	26,237	4,214
Value	$1,620,610	$985,772	$111,726	$1,809,902	$919,329	$110,496
Hydraulic Presses						
Units	5,685	1,633	102	7,206	2,066	114
Value	$ 187,452	$ 78,077	$ 6,105	$ 264,440	$ 78,681	$ 3,535
Mechanical Presses						
Units	9,710	5,040	393	13,205	8,018	672
Value	$1,166,316	$577,994	$ 21,453	$1,148,233	$421,342	$ 25,556
Forging & Stamping Machines						
Units	608	274	89	748	510	74
Value	$ 56,077	$ 34,472	$ 28,775	$ 77,768	$ 55,193	$ 16,332
Shearing Machines						
Units	4,344	8,556	303	5,829	6,200	433
Value	$ 105,572	$110,564	$ 9,859	$ 153,710	$ 40,493	$ 2,723
Bending Machines						
Units	866	2,030	335	974	2,491	738
Value	$ 48,140	$ 65,687	$ 16,095	$ 54,536	$ 72,220	$ 17,167
Wire Forming Machines						
Units	890	209	5	1,677	803	236
Value	$ 57,066	$ 9,237	$ 671	$ 111,221	$ 27,944	$ 8,326
Other Metal Forming Machines						
Units	—	16,106	3,908	—	6,149	1,947
Value	—	$109,741	$ 28,768	—	$223,496	$ 36,857

Note: Individual items may not add to totals due to rounding.

Source: Japan Metal Forming Machinery Builders' Association.

JAPANESE PRODUCTION, EXPORTS AND IMPORTS OF METAL CUTTING MACHINE TOOLS

By Type of Machine, 1988

(Values in Thousands of U.S. Dollars)

	Production		Exports		Imports	
	Units	Value	Units	Value	Units	Value
TOTAL, (incl. NC)	169,326	687,529	371,411	250,869	92,592	28,307
Numerically Controlled	47,650	484,288	19,239	199,870	855	11,260
Lathes	28,257	177,163	11,889	78,167	1,873	2,687
Numerically Controlled	20,942	158,562	8,186	73,029	141	1,202
Horizontal	20,209	149,237	7,891	68,363	107	631
Vertical	733	9,325	295	4,666	34	571
Center Lathes	3,110	8,335	1,475	1,099	1,258	918
Automatic Lathes	2,536	8,197	1,014	2,781	174	418
Other Lathes	1,669	2,069	1,214	1,258	300	148
Drilling Machines	31,731	17,509	7,334	9,423	24,543	513
Numerically Controlled	2,438	12,070	1,189	6,517	10	165
Radial	241	713	121	209	—	—
Multi-spindle	370	1,387	801	1,910	—	—
Bench-Type Drilling	26,546	1,937	—	—	—	—
Other Drilling	2,136	1,402	5,223	787	24,533	349
Boring Machines	1,223	15,180	515	6,977	77	989
Numerically Controlled	195	7,526	125	4,503	23	584
Horizontal	188	4,425	—	—	—	—
Jig Type	548	2,454	—	—	—	—
Other Boring	292	776	390	2,474	54	405
Milling Machines	6,959	37,920	2,306	9,162	1,308	632
Numerically Controlled	2,319	23,547	328	5,970	76	194
Bed Type	1,109	4,693	—	—	—	—
Knee Type	2,792	7,443	380	912	387	192
Profile	402	1,152	50	187	—	—
Other Milling	337	1,085	1,548	2,093	845	246
Grinding Machines	11,667	85,304	13,017	31,028	60,125	8,005
Numerically Controlled	1,447	22,189	805	12,432	156	3,316
External Cylindrical	1,540	13,148	207	2,335	66	773
Internal Cylindrical	503	6,198	101	1,105	19	140
Surface	4,336	20,344	711	2,151	830	1,056
Centerless	796	8,783	182	2,024	—	—
Honing or Lapping	381	2,790	298	1,362	514	453
Tool or Cutter	1,316	2,624	4,099	1,212	17,421	568
Other Grinding	1,348	9,228	6,614	8,408	41,119	1,700
Gear Cutting or Finishing	1,001	12,972	474	3,678	201	3,336
Numerically Controlled	NA	NA	161	2,638	45	2,069
Gear Hobbing	542	5,874	162	538	107	326
Other Gear Cutting	141	2,534	79	330	19	359
Gear Finishing	318	4,564	52	172	30	581
Special Purpose Machines	5,074	80,819	99	5,993	12	430
Numerically Controlled	1,640	28,368	28	3,356	—	—
Other Special Purpose	3,434	52,452	71	2,637	—	—
Machining Centers	11,474	161,377	4,351	64,718	80	517
Horizontal Spindle	2,692	60,920	1,258	29,486	19	130
Vertical Spindle	7,712	77,053	2,742	29,004	61	388
Double Column Type	1,060	22,723	—	—	—	—
Turning Centers	10	679	351	6,228	—	—
Electrical Discharge	6,140	58,940	2,743	23,190	503	1,817
Numerically Controlled	5,819	56,143	2,524	22,169	169	1,480
Other EDM	321	2,797	219	1,021	334	337
Other Metal Cutting	65,800	40,346	328,683	18,533	3,870	10,185
Numerically Controlled	1,376	14,508	1,402	1,856	155	1,733
Planing, Shaping, etc.	227	1,735	1,456	652	20	66
Sawing or cut off	6,116	6,479	313,263	8,913	2,432	726
Screw Cutting/Tapping	56,564	6,937	8,118	1,434	66	46
Metal Cutting, nec	1,517	10,687	4,292	5,680	1,197	7,160

Note: Individual items may not add to totals due to rounding.

Sources: Japan, Ministry of International Trade and Industry: Ministry of Finance.

JAPANESE EXPORTS OF METAL CUTTING MACHINE TOOLS

By Type of Machine and For Selected Destinations, 1988

(Values in Thousands of Dollars)

Type of Machine	Destination							
	South Korea	Taiwan	Singapore	United Kingdom	West Germany	PRC	Canada	United States
GRAND TOTAL								
UNITS	4,204	15,534	9,020	10,128	6,738	15,529	25,932	189,939
VALUE	$296,957	$128,115	$68,404	$106,945	$254,069	$28,545	$43,527	$842,396
Numerically Controlled								
Units	985	758	468	891	2,680	47	320	8,514
Value	$182,856	$ 85,002	$40,851	$ 95,693	$245,837	$ 7,296	$37,409	$729,941
Lathes								
Units	411	396	374	566	1,378	73	167	3,708
Value	$ 25,657	$ 17,323	$16,270	$ 49,785	$ 90,628	$ 2,591	$15,162	$305,392
Drilling Machines								
Units	666	498	920	387	790	75	10	988
Value	$ 14,093	$ 4,690	$ 5,306	$ 2,130	$ 15,084	$ 4,464	$ 835	$ 26,262
Boring Machines								
Units	115	73	36	8	2	13	13	41
Value	$ 21,139	$ 6,375	$ 3,668	$ 2,481	$ 258	$ 2,029	$ 3,270	$ 12,407
Milling Machines								
Units	156	217	87	5	48	25	9	1,175
Value	$ 22,419	$ 14,850	$ 4,245	$ 382	$ 2,700	$ 1,155	$ 905	$ 19,680
Grinding Machines								
Units	1,170	613	1,201	924	612	245	511	3,231
Value	$103,986	$ 21,171	$18,112	$ 7,928	$ 2,918	$ 5,298	$ 1,764	$ 65,080
Gear Cutting or Finishing								
Units	174	123	11	0	0	19	0	29
Value	$ 23,340	$ 4,518	$ 882	$ 0	$ 0	$ 336	$ 0	$ 4,518
Special Purpose Machines								
Units	60	9	0	2	2	0	0	13
Value	$ 33,687	$ 3,496	$ 0	$ 2,091	$ 117	$ 0	$ 0	$ 16,528
Machining Centers								
Units	54	121	61	163	555	8	116	2,013
Value	$ 12,400	$ 19,188	$ 7,444	$ 28,178	$ 72,673	$ 1,904	$15,240	$249,387
Electrical Discharge Machines								
Units	162	267	90	129	718	16	14	888
Value	$ 18,026	$ 21,319	$ 7,835	$ 9,863	$ 59,992	$ 2,591	$ 1,100	$ 77,604
Other Metal Cutting								
Units	1,216	13,217	6,240	7,944	2,633	15,055	25,092	177,853
Value	$ 22,208	$ 15,185	$ 4,643	$ 4,105	$ 9,700	$ 8,178	$ 5,252	$ 65,517

Exchange Rate: $1 = 144.64 Yen.

Note: Individual items may not add to totals due to rounding.

Source: Japan, Ministry of Finance.

JAPANESE PRODUCTION OF NUMERICALLY CONTROLLED METAL CUTTING MACHINE TOOLS

By Type of Machine, 1982 to Date

(Values in Thousands of U.S. Dollars)

Type of Machine	1982	1983	1984	1985	1986	1987	1988
GRAND TOTAL							
Units	24,138	26,408	38,036	44,969	38,776	35,460	47,650
Value	$1,693,551	$1,796,127	$2,483,723	$2,950,449	$3,622,994	$3,364,664	$4,842,879
Boring Machines							
Units	139	140	215	168	208	168	195
Value	$ 45,304	$ 42,236	$ 43,499	$ 38,430	$ 65,512	$ 53,733	$ 75,256
Drilling Machines							
Units	201	501	631	633	1,339	1,597	2,438
Value	$ 7,380	$ 17,817	$ 20,470	$ 19,116	$ 42,155	$ 63,219	$ 120,702
Milling Machines							
Units	2,331	2,468	2,775	2,664	1,977	1,811	2,319
Value	$ 135,968	$ 141,887	$ 146,779	$ 160,841	$ 166,603	$ 172,497	$ 235,474
Grinding Machines							
Units	294	343	671	1,051	1,059	939	1,447
Value	$ 23,867	$ 24,646	$ 49,301	$ 78,138	$ 131,474	$ 131,630	$ 221,888
Lathes							
Units	10,344	10,020	16,555	19,084	15,976	15,241	20,942
Value	$ 562,963	$ 511,494	$ 812,045	$ 926,377	$1,080,370	$1,079,307	$1,585,618
Special Machines							
Units	137	497	1,193	1,531	1,441	1,140	1,640
Value	$ 39,795	$ 62,799	$ 129,383	$ 190,350	$ 235,758	$ 198,818	$ 283,675
Elec. Discharge Machines							
Units	3,534	4,233	5,034	5,830	5,240	4,744	5,819
Value	$ 197,671	$ 256,585	$ 314,858	$ 375,811	$ 492,488	$ 433,691	$ 561,428
Machining Centers							
Units	6,942	7,791	10,252	13,345	10,857	9,027	11,474
Value	$ 649,853	$ 701,368	$ 897,002	$1,120,609	$1,353,394	$1,160,343	$1,613,765
Other NC Metal Cutting Machines							
Units	216	415	710	663	679	793	1,376
Value	$ 30,749	$ 37,294	$ 70,386	$ 40,781	$ 55,240	$ 71,426	$ 145,080

Note: Individual items may not add to totals due to rounding.

Source: Japan, Ministry of International Trade and Industry.

JAPANESE TRADE WITH THE UNITED STATES NUMERICALLY CONTROLLED METAL CUTTING MACHINE TOOLS

By Type of Machine, 1988

(Values in Thousands of U.S. Dollars)

	Exports to U.S.		Imports from U.S.	
Type of Machine	Units	Value	Units	Value
Boring Machines	32	$ 11,713	1	1,116
Drilling Machines	430	20,929	0	0
Grinding Machines	277	27,374	37	$9,161
Lathes	3,590	299,501	2	156
Milling	65	15,435	2	70
Machines Centers	2,013	249,387	5	616
Other	2,107	105,603	146	20,648

Source: Japan, Ministry of Finance.

JAPANESE EXPORTS OF MACHINE TOOLS

Metal Cutting and Metal Forming, 1986 to Date

(Values in Thousands of U.S. Dollars)

Destination	1986		1987		1988	
	Units	Value	Units	Value	Units	Value
TOTAL CUTTING	433,243	$2,157,643	373,969	$2,049,046	371,411	$2,508,685
North & South America						
Brazil	148	$ 6,747	260	$ 13,834	187	$ 13,750
Canada	47,640	33,848	16,370	40,196	25,932	43,527
Mexico	185	5,875	86	4,432	152	17,160
U.S.A.	269,692	859,299	231,996	673,576	189,939	842,396
Western Europe						
Belgium	2,627	110,159	2,675	120,541	2,435	108,014
France	5,244	29,859	5,038	28,567	6,543	69,216
Netherlands	1,867	16,354	3,162	12,217	1,902	16,683
Norway	903	7,940	1,136	3,823	570	5,673
Sweden	1,198	35,474	1,246	33,614	1,055	42,138
United Kingdom	7,464	78,554	8,355	70,672	10,128	106,945
West Germany	4,896	184,257	5,526	192,989	6,738	254,069
Eastern Europe						
Poland	15	3,103	3	1,265	4	694
Romania	—	—	—	—	—	—
U.S.S.R.	303	39,568	190	29,867	234	52,532
Asia						
Burma	85	1,252	69	1,072	128	2,474
China	2,285	157,803	13,452	62,611	15,529	27,842
Korea	3,082	178,483	3,929	268,439	4,204	296,957
Philippines	1,833	3,525	770	4,114	1,476	4,542
Singapore	4,999	22,769	7,651	42,464	9,020	68,404
Taiwan	8,635	45,911	12,403	99,640	15,534	128,115
Thailand	2,023	11,079	3,668	30,372	6,430	63,714
All Other Countries						
Australia	21,048	63,541	20,903	33,829	28,500	46,016
South Africa	1,660	4,818	2,420	8,082	3,316	9,996
All Other Countries	45,411	257,425	32,661	272,829	41,455	311,237
TOTAL FORMING	27,790	$ 905,809	33,848	$ 985,772	26,237	$ 919,329
North America						
Canada	265	$ 82,809	481	$ 28,498	631	$ 61,194
Mexico	78	6,272	214	4,784	86	1,030
U.S.A.	10,345	451,371	9,523	422,185	7,368	303,855
Western Europe						
France	129	6,539	190	8,801	298	18,712
Italy	147	2,949	89	8,753	105	10,074
Switzerland	226	1,098	29	1,493	177	1,529
United Kingdom	711	10,230	918	43,439	716	27,202
West Germany	1,033	26,305	993	18,847	447	20,179
Eastern Europe						
U.S.S.R.	27	20,472	41	57,418	135	69,551
Asia						
China	1,547	103,970	923	83,774	1,001	52,329
Indonesia	1,150	6,812	554	11,504	298	7,437
Korea	1,166	53,893	1,483	81,437	1,290	90,612
Malaysia	234	6,569	483	14,526	500	16,332
Singapore	722	14,040	1,049	30,012	1,253	27,694
Taiwan	1,479	27,510	2,353	55,821	2,071	80,546
All Other Countries	8,531	84,969	14,525	113,848	9,861	131,050

Note: Individual items may not add to totals due to rounding.

Sources: Japan, Ministry of Finance and Ministry of International Trade and Industry.

JAPANESE IMPORTS OF MACHINE TOOLS

Metal Cutting and Metal Forming, 1986 to Date

(Values in Thousands of U.S. Dollars)

	1986		1987		1988	
Country of Origin	Units	Value	Units	Value	Units	Value
TOTAL CUTTING	15,851	$197,253	42,429	$152,606	92,592	$286,586
United States	1,240	$ 31,622	1,022	$ 29,266	2,238	$106,157
Western Europe						
Austria	197	356	145	3,996	280	609
France	361	1,430	480	698	356	3,160
Italy	377	3,566	383	3,187	1,147	4,245
Sweden	79	807	39	111	70	1,358
Switzerland	665	51,667	437	36,338	712	58,268
United Kingdom	344	3,810	2,373	2,890	225	4,869
West Germany	902	68,633	737	42,727	1,515	56,293
Eastern Europe						
Czechoslovakia	10	356	12	767	7	983
East Germany	30	3,643	42	2,904	22	4,229
Poland	2	47	3	422	2	250
U.S.S.R.	263	4,890	220	4,432	120	5,150
Asia						
Singapore	620	6,189	793	7,494	863	9,255
Taiwan	9,664	8,996	34,553	10,315	78,460	18,096
Other Countries	1,097	11,239	1,190	7,059	6,575	13,664
TOTAL FORMING	2,992	$ 75,047	5,135	$111,726	4,214	$110,496
United States	1,525	$ 24,958	1,155	$ 32,792	1,470	$ 47,671
Western Europe						
Switzerland	251	11,732	257	11,352	321	20,476
West Germany	185	24,780	241	33,179	316	20,546
Other Countries	1,031	13,577	3,482	34,403	2,107	21,803

Note: Individual items may not add to totals due to rounding.

Source: Japan, Ministry of Finance.

JAPANESE IMPORTS OF METAL CUTTING MACHINE TOOLS

By Type of Machine and Selected Countries, 1988

(Values in Thousands of Dollars)

Type of Machine	Country of Origin							
	South Korea	Taiwan	Singapore	West Germany	Switzerland	Italy	USSR	United States
GRAND TOTAL								
UNITS	907	78,460	863	1,515	712	1,147	120	2,238
VALUE	$7,733	$18,096	$9,255	$56,293	$58,268	$4,245	$5,150	$106,157
Numerically Controlled								
Units	61	157	2	89	154	5	7	193
Value	$3,285	$ 3,449	$ 55	$28,365	$34,069	$ 812	$1,381	$ 31,767
Lathes								
Units	222	933	0	57	81	14	33	20
Value	$2,341	$ 6,812	$ 0	$ 7,608	$ 2,840	$ 164	$1,342	$ 663
Drilling Machines								
Units	4	23,957	0	9	7	0	12	183
Value	$ 62	$ 2,427	$ 0	$ 62	$ 1,444	$ 0	$ 125	$ 164
Boring Machines								
Units	0	16	0	9	9	10	15	3
Value	$ 0	$ 507	$ 0	$ 632	$ 3,824	$ 117	$2,380	$ 1,171
Milling Machines								
Units	103	719	96	38	14	151	17	16
Value	$ 890	$ 1,607	$ 671	$ 1,233	$ 390	$ 336	$ 507	$ 101
Grinding Machines								
Units	74	51,420	764	1,018	184	537	32	854
Value	$1,106	$ 3,223	$8,566	$25,665	$17,573	$1,436	$ 218	$ 16,340
Gear Cutting or Finishing								
Units	0	2	0	24	131	1	3	28
Value	$ 0	$ 62	$ 0	$ 8,787	$17,737	$ 289	$ 156	$ 2,645
Special Purpose Machines								
Units	0	0	0	1	7	3	0	1
Value	$ 0	$ 0	$ 0	$ 359	$ 2,005	$1,475	$ 0	$ 460
Machining Centers								
Units	40	26	0	0	0	0	0	5
Value	$2,755	$ 1,030	$ 0	$ 0	$ 0	$ 0	$ 0	$ 616
Electrical Discharge Machines								
Units	2	108	0	15	100	0	1	260
Value	$ 39	$ 1,069	$ 0	$ 195	$11,026	$ 0	$ 23	$ 5,634
Other Metal Cutting								
Units	462	1,279	3	344	179	431	7	868
Value	$ 538	$ 1,358	$ 16	$11,752	$ 1,428	$ 429	$ 398	$ 78,361

Exchange rate: $1 = 144.64 Yen.

Note: Individual items may not add to totals due to rounding.

Source: Japan, Ministry of Finance.

UNITED KINGDOM NET NEW ORDERS AND SHIPMENTS OF MACHINE TOOLS

1969 to Date

(Millions of Dollars)

Year	Net New Orders			Shipments			Unfilled Orders
	Total	Domestic	Foreign	Total	Domestic	Foreign	
1969	569.3	361.7	207.6	453.8	285.8	168.0	394.1
1970	513.4	313.9	199.4	524.6	329.5	195.1	382.8
1971	380.9	199.8	181.1	513.1	300.6	212.4	261.8
1972	480.4	303.5	176.9	462.1	279.2	182.9	283.5
1973	701.2	429.1	272.1	487.2	286.8	200.4	473.0
1974	813.7	448.8	364.9	595.0	350.6	244.4	731.9
1975	548.4	321.5	226.9	723.0	414.2	308.8	510.6
1976	570.8	346.8	224.0	635.8	377.5	258.3	350.4
1977	839.8	553.5	286.3	707.1	443.5	263.6	471.4
1978	1,046.4	689.3	357.1	960.0	599.0	361.0	604.8
1979	1,260.3	771.6	488.7	1,205.9	793.6	412.3	742.7
1980	1,038.8	562.3	476.5	1,370.6	813.9	556.7	418.7
1981	865.3	273.2	592.1	903.2	498.5	404.7	304.2
1982	576.8	327.0	249.8	763.6	414.0	349.6	157.5
1983	471.7	259.7	212.0	544.0	318.5	225.5	NA
1984	535.5	284.3	251.2	519.6	303.3	216.3	NA
1985	618.3	321.8	296.5	580.4	316.9	263.5	NA
1986	730.6	341.8	388.8	735.4	409.6	325.8	NA
1987(r)	831.1	420.2	410.9	829.3	448.7	380.6	NA
1988(p)	1,071.0	536.9	534.1	1,164.0	616.5	547.4	NA

NA - Not Available. p - Preliminary. r - Revised.

Note: Net new orders and shipments beginning in 1986 are estimated from a larger sampling of firms and, consequently, are reflected in higher figures.

Source: The Machine Tool Trades Association and the Department of Trade and Industry.

UNITED KINGDOM EMPLOYMENT IN THE MACHINE TOOL INDUSTRY

Number of Employees, 1968 to Date

Mid-Year	Employees	Mid-Year	Employees
1968	63,600	1978	48,500
1969	63,700	1979	48,350
1970	65,100	1980	46,350
1971	59,000	1981 (r)	36,700
1972	50,100	1982 (r)	29,825
1973	48,400	1983 (r)	25,925
1974	50,000	1984 (r)	23,775
1975	49,100	1985 (r)	23,800
1976	47,050	1986 (r)	23,400
1977	47,675	1987 (p)	23,200

p - Preliminary. r - Revised.

Note: Data from 1982 forward relates to Great Britain only.

Source: The Machine Tool Trades Association and the Department of Trade and Industry.

UNITED KINGDOM SHIPMENTS OF NUMERICALLY CONTROLLED MACHINE TOOLS

By Type of Machine, Units and Value, 1987 and 1988

(Values in Thousands of U.S. Dollars)

Type of Machine	1987 (r) Units	1987 (r) Value	1988 (p) Units	1988 (p) Value
TOTAL (excluding parts)	NA	$291,232	NA	$478,129
Drilling Machines Boring Machines Milling Machines	NA	28,517	NA	111,694
Machining Centers - Horizontal	131	44,906	178	52,017
Machining Centers - Vertical	756	73,587	1,015	124,164
Machining Centers (manual tool change) and Indexing Turret	830	43,992	911	50,414
Lathes	NA	30,156	666	47,385
Other Numerically Controlled Machines	314	70,024	372	92,455

p - Preliminary. r - Revised.

Note: Individual items may not add to totals due to rounding.

Source: United Kingdom, Department of Trade and Industry.

UNITED KINGDOM ORDERS AND SHIPMENTS OF NUMERICALLY CONTROLLED MACHINE TOOLS

1970 to Date

(Values in Thousands of Dollars)

	New Orders				Shipments			
	Total		Foreign		Total		Foreign	
Year	Units	Value	Units	Value	Units	Value	Units	Value
1970(a)	725	$ 52,561	350	$ 26,978	600	$ 37,773	241	$ 15,848
1971	343	26,320	156	12,842	590	44,591	280	23,023
1972	548	42,199	189	14,551	381	27,173	150	12,735
1973	634	44,562	238	18,884	462	30,379	178	13,255
1974	739	65,520	353	32,362	709	37,452	246	15,171
1975	283	28,833	70	8,610	739	52,719	271	20,898
1976	535	57,429	157	17,820	612	48,635	192	17,598
1977	614	78,484	155	22,406	724	58,307	NA	17,347(b)
1978	681	105,986	209	26,135	969	102,376	245	29,086
1979	1,262	180,516	399	48,063	1,058	139,125	251	36,078
1980	978	160,736	397	60,193	1,240	196,985	421	54,712
1981	1,237	192,812	398	75,702	1,196	165,037	399	56,167
1982	1,370	124,583	NA	35,280	1,510	173,718	424	74,738
1983	2,010	125,721	NA	42,646	1,825	130,767	489	43,804
1984	NA	152,698	NA	64,093	NA	157,594	815	51,033
1985	NA	219,075	NA	100,982	NA	184,723	NA	79,074
1986	NA	308,510	NA	170,319	NA	254,084	NA	122,641
1987(r)	NA	314,833	NA	146,354	NA	291,232	NA	128,818
1988(p)	NA	457,998	NA	230,869	NA	478,128	NA	233,363

NA - Not Available. p - Preliminary. r - Revised.

(a) Includes parts.
(b) Does not include figures for Drilling, Boring or Milling Machines.

Source: The Machine Tool Trades Association, and United Kingdom, Department of Trade and Industry.

UNITED KINGDOM SHIPMENTS OF METAL CUTTING MACHINE TOOLS (a)

By Type of Machine, Units and Value, 1987 and 1988

(Values in Thousands of U.S. Dollars)

Type of Machine	1987(r)		1988(p)	
	Units	Value	Units	Value
TOTAL	NA	$364,328	NA	$450,871
Boring Machines				
Fine	93	3,442	NA	NA
Horizontal				
Jig, Vertical and Other	—	—	—	—
Drilling Machines				
Vertical	710	3,769	502	6,769
Radial and Other				
Gear Cutting and Finishing Machines)	(b)	(b)	(b)	(b)
Grinding and Polishing Machines				
Cylindrical—External	208	16,061	NA	26,008
Cylindrical—Universal				
Cylindrical—Internal	NA	NA	NA	NA
Surface	513	11,800	512	15,498
Tool and Cutter	NA	3,114	NA	(d)
Other Grinding	(d)	(d)	(d)	(d)
Honing and Lapping	1,007	13,111	641	24,049
Lathes	NA	56,870	NA	80,341
Milling Machines	NA	21,961	NA	24,940
Other Metal Cutting				
Transfer, Single Station and Unit Head Machines	NA	62,278	NA	61,280
Sawing and Cut-Off	6,210	6,883	NA	10,510
Screwing and Threading	NA	11,308	NA	10,510
Other Metal Cutting, N.E.C.				
Parts for Metal Cutting Machine Tools	—	153,729	—	190,966 (c)

NA - Not Available. p - Preliminary. r - Revised.

(a) Excludes numerically controlled machines.
(b) Included in "Other Metal Cutting, N.E.C."
(c) Includes electrical discharge machines.
(d) Included in "Honing and Lapping."

Exchange Rate: 1986 1 Pound = $1.467; 1987 1 Pound = $1.6389.

Note: Individual items may not add to totals due to rounding.

Source: United Kingdom, Department of Trade and Industry.

UNITED KINGDOM SHIPMENTS OF METAL FORMING MACHINE TOOLS (a)
By Type of Machine, Units and Value, 1987 and 1988
(Values in Thousands of U.S. Dollars)

Type of Machine	1987(r) Units	1987(r) Value	1988(p) Units	1988(p) Value
TOTAL	—	$128,326	—	$153,735
Presses				
Hydraulic—Open Front	NA	5,736	NA	11,757
Hydraulic— Straight, Extrusion & Other	NA	6,228	NA	8,551
Mechanical— Open Front	(b)	(b)	(b)	(b)
Mechanical—Straight Sided	(b)	(b)	(b)	(b)
Other Mechanical	(b)	(b)	(b)	(b)
Forging Machines	NA	3,278	NA	3,563
Shearing Machines	(b)	(b)	NA	14,964
Plate & Sheet Bending & Forming	(b)	(b)	(b)	(b)
Bar, Tube & Section Drawing & Forming	279	18,028	67	16,745
Wire and Strip Drawing & Forming	228	11,964	NA	8,907
Sheet Metal	64	2,786	(b)	(b)
Other Bending & Working	(b)	(b)	(b)	(b)
Riveting and Other Metal Forming	NA	44,086	NA	51,126
Parts for Metal Forming Machine Tools	—	36,220	—	37,944

p - Preliminary. r - Revised.

(a) Excludes numerically controlled machines.
(b) Included in "Riveting and Other Metal Forming."

Source: United Kingdom, Department of Trade and Industry.

UNITED KINGDOM IMPORTS AND EXPORTS OF MACHINE TOOLS
New and Used, For Selected Countries, 1987
(Values in U.S. Dollars)

Imports		Exports			
Origin	Value	Destination	Value	Destination	Value
West Germany	$182,222,681	U.S.A.	$97,320,619	South Africa	$8,408,519
Japan	115,074,180	West Germany	52,694,291	South Korea	6,833,058
U.S.A.	43,623,609	France	34,453,978	Finland	6,176,121
Switzerland	36,842,480	Spain	29,372,092	Iran	5,424,526
Italy	25,687,617	Italy	24,660,818	Egypt	5,317,642
Taiwan	21,395,817	Canada	23,747,654	Norway	5,076,912
Sweden	16,588,944	Belgium	21,066,876	Iraq	4,719,339
Belgium	13,407,544	Sweden	18,364,961	Austria	4,198,981
France	13,295,394	Australia	14,988,771	Brazil	4,157,153
Spain	12,015,936	U.S.S.R.	14,796,674	Pakistan	3,894,076
Austria	10,669,590	Holland	13,391,065	Turkey	3,785,934
United Kingdom	10,043,291	Ireland	11,800,542	Japan	3,707,421
Holland	6,446,667	Switzerland	11,130,216	Portugal	3,529,971
East Germany	3,573,090	China	10,213,998	Denmark	2,998,386
Portugal	2,913,040	India	9,574,791	Israel	2,672,926

Exchange Rate: 1 Pound = $1.6389.

Source: The Department of Trade and Industry.

UNITED KINGDOM EXPORTS OF NEW MACHINE TOOLS, 1987

By Type of Machine, Total and NC; Total & Major Countries of Destination

(Values in Thousands of U.S. Dollars)

Type of Machine	Total Worldwide	United States	West Germany	France	Spain	Italy	Canada	Belgium
Grand Total (incl. NC)								
Units	26,725	5,329	2,056	1,228	529	1,176	1,369	554
Value	$500,961	$97,321	$52,694	$34,455	$29,372	$24,661	$23,748	$21,066
Boring (incl. NC)								
Units	583	43	35	6	158	29	27	15
Value	$ 43,382	$ 6,665	$ 3,889	$ 38	$15,330	$ 1,003	$ 2,017	$ 2,334
Boring, NC								
Units	139	24	12	—	59	—	4	10
Value	$ 31,280	$ 5,574	$ 2,368	—	$11,515	—	$ 1,644	$ 2,303
Drilling (incl. NC)								
Units	770	82	19	51	7	20	29	16
Value	$ 12,959	$ 1,488	$ 488	$ 647	$ 111	$ 280	$ 2,339	$ 175
Drilling, NC								
Units	47	7	4	3	2	—	4	1
Value	$ 7,855	$ 1,023	$ 365	$ 302	$ 87	—	$ 2,201	$ 70
Gear Cutting & Finishing (incl. NC)								
Units	95	6	21	3	—	14	6	5
Value	$ 4,328	$ 1,347	$ 733	$ 126	—	$ 479	$ 247	$ 341
Gear Cutting & Finishing, NC								
Units	7	4	1	—	—	—	1	—
Value	$ 1,754	$ 1,121	$ 31	—	—	—	$ 225	—
Grinding & Polishing(incl. NC)								
Units	4,202	833	247	356	58	148	198	69
Value	$ 76,048	$19,896	$ 5,241	$ 6,541	$ 3,188	$ 4,738	$ 2,253	$ 1,475
Grinding & Polishing, NC								
Units	118	13	9	8	2	19	7	2
Value	$ 18,546	$ 4,223	$ 1,075	$ 1,783	$ 1,296	$ 1,821	$ 170	$ 949
Lathes (incl. NC)								
Units	6,046	995	557	257	76	286	212	114
Value	$ 94,848	$17,925	$11,538	$ 7,650	$ 2,312	$ 6,056	$ 3,089	$ 5,074
Lathes, NC								
Units	338	49	39	43	12	25	7	48
Value	$ 31,695	$ 5,033	$ 3,935	$ 3,532	$ 1,231	$ 2,352	$ 762	$ 3,992
Milling (incl. NC)								
Units	1,446	341	62	32	22	112	119	13
Value	$ 37,747	$10,187	$ 1,280	$ 783	$ 1,200	$ 2,991	$ 903	$ 413
Milling, NC								
Units	521	174	11	13	10	36	5	8
Value	$ 24,708	$ 6,819	$ 541	$ 549	$ 636	$ 1,826	$ 144	$ 298
Other Metal Cutting								
Units	5,285	1,161	371	269	39	293	550	75
Value	$112,810	$20,590	$19,095	$14,608	$ 2,281	$ 5,166	$ 2,732	$ 6,284
Total Metal Forming								
Units	8,298	1,868	744	254	169	274	228	247
Value	$118,838	$19,223	$10,430	$ 4,061	$ 4,949	$ 3,948	$10,166	$ 4,971

Exchange Rate: 1 Pound = $1.6389.

Note: Individual items may not add to totals due to rounding.

Source: The Department of Trade and Industry.

UNITED KINGDOM EXPORTS OF NEW MACHINE TOOLS, 1986

By Type of Machine, Total and N/C; Total & Major Countries of Destination

(Values in Thousands of U.S. Dollars)

Type of Machine	Total Worldwide	United States	West Germany	China	France	Italy	India	Canada
Grand Total (incl. N/C)								
Units	21,751	4,233	2,389	152	1,134	872	375	965
Value	$377,546	$91,270	$43,555	$18,040	$26,890	$14,251	$12,814	$15,689
Boring (incl. N/C)								
Units	516	131	56	26	26	29	20	18
Value	$ 22,278	$ 3,494	$ 3,639	$ 1,629	$ 2,568	$ 314	$ 2,175	$ 1,162
Boring, N/C								
Units	59	10	14	2	8	1	5	2
Value	$ 12,900	$ 1,956	$ 2,852	$ 486	$ 2,294	$ 169	$ 1,700	$ 602
Drilling (incl, N/C)								
Units	970	52	69	3	101	12	20	5
Value	$ 6,423	$ 1,074	$ 420	$ 39	$ 184	$ 255	$ 174	$ 83
Drilling, N/C								
Units	22	5	3	—	—	—	1	1
Value	$ 1,973	$ 446	$ 244	—	—	—	$ 86	$ 59
Gear Cutting & Finishing (incl. N/C)								
Units	129	20	17	2	—	11	30	3
Value	$ 3,263	$ 831	$ 681	$ 401	—	$ 123	$ 94	$ 134
Gear Cutting & Finishing, NC								
Units	17	—	1	2	—	—	13	—
Value	$ 736	—	$ 118	$ 401	—	—	$ 44	—
Grinding & Polishing (incl. N/C)								
Units	3,328	708	317	28	201	124	98	104
Value	$ 55,841	$18,246	$ 5,206	$ 1,159	$ 3,813	$ 1,632	$ 1,668	$ 1,166
Grinding & Polishing, NC								
Units	49	13	9	1	1	1	1	—
Value	$ 12,978	$ 3,962	$ 1,941	$ 106	$ 453	$ 165	$ 222	—
Lathes (incl. N/C)								
Units	4,043	972	537	18	230	120	21	192
Value	$ 73,149	$21,495	$ 9,824	$ 1,090	$ 5,029	$ 3,229	$ 2,386	$ 1,994
Lathes, N/C								
Units	217	62	25	9	26	12	13	2
Value	$ 20,996	$ 5,215	$ 2,961	$ 758	$ 2,123	$ 1,233	$ 1,950	$ 128
Milling (incl. N/C)								
Units	1,111	244	70	11	64	136	27	70
Value	$ 38,462	$11,423	$ 2,885	$ 1,644	$ 1,648	$ 3,782	$ 1,299	$ 1,383
Milling, N/C								
Units	438	179	34	2	17	18	5	10
Value	$ 24,644	$ 9,015	$ 2,141	$ 64	$ 1,161	$ 1,296	$ 862	$ 914
Other Metal Cutting								
Units	3,190	905	332	21	189	101	85	302
Value	$ 74,955	$12,517	$12,045	$ 3,783	$ 8,667	$ 2,484	$ 2,830	$ 2,409
Total Metal Forming								
Units	8,464	1,201	991	43	323	339	74	271
Value	$103,177	$22,190	$ 8,853	$ 8,295	$ 4,981	$ 2,432	$ 2,188	$ 7,356

Exchange Rate: 1 Pound = $1.467.

Source: The Department of Trade and Industry.

UNITED KINGDOM IMPORTS OF NEW MACHINE TOOLS, 1987

By Type of Machine, Total and NC; Total & Major Countries of Destination

(Values in Thousands of U.S. Dollars)

Type of Machine	Total Worldwide	West Germany	Japan	United States	China	Italy	Taiwan	Sweden
Grand Total (incl. NC)								
Units	38,431	11,334	4,708	5,183	1,850	3,666	1,075	1,067
Value	$516,942	$182,219	$115,074	$43,624	$36,767	$20,709	$14,768	$16,589
Boring (incl. NC)								
Units	281	122	14	34	21	17	—	3
Value	$ 18,939	$ 11,518	$ 1,414	$ 980	$ 1,896	$ 374	—	$ 477
Boring, NC								
Units	54	29	9	2	5	1	—	1
Value	$ 14,589	$ 9,678	$ 1,075	$ 474	$ 1,837	$ 236	—	$ 474
Drilling (incl. NC)								
Units	1,904	241	119	670	28	29	—	94
Value	$ 11,728	$ 5,485	$ 1,383	$ 859	$ 1,270	$ 311	—	$ 180
Drilling, NC								
Units	107	45	24	6	7	1	—	1
Value	$ 8,190	$ 4,035	$ 1,264	$ 577	$ 1,134	$ 44	—	$ 5
Gear Cutting & Finishing (incl. NC)								
Units	34	12	1	2	3	4	—	1
Value	$ 5,587	$ 2,873	$ 129	$ 392	$ 680	$ 175	—	$ 48
Gear Cutting & Finishing, NC								
Units	15	9	1	1	1	—	—	—
Value	$ 4,038	$ 2,416	$ 129	$ 270	$ 402	—	—	—
Grinding & Polishing (incl. NC)								
Units	6,732	2,586	917	745	102	331	10	252
Value	$ 62,747	$ 20,930	$ 7,845	$ 7,257	$ 8,930	$ 5,836	$ 84	$ 2,042
Grinding & Polishing, NC								
Units	122	27	47	17	19	2	—	3
Value	$ 24,075	$ 7,629	$ 6,249	$ 1,865	$ 4,533	$ 1,031	—	$ 1,175
Lathes (incl. NC)								
Units	3,191	551	685	170	117	63	588	78
Value	$118,696	$ 38,963	$ 39,099	$ 4,237	$ 5,474	$ 2,658	$ 6,393	$ 4,813
Lathes, NC								
Units	847	174	413	37	9	15	107	20
Value	$ 90,236	$ 31,967	$ 35,567	$ 3,053	$ 1,906	$ 1,431	$ 4,317	$ 3,997
Milling (incl. NC)								
Units	1,248	317	23	18	6	71	117	17
Value	$ 33,874	$ 11,425	$ 2,040	$ 551	$ 2,201	$ 1,573	$ 3,165	$ 239
Milling, NC								
Unit	278	83	16	5	2	14	117	—
Value	$ 22,038	$ 8,709	$ 1,754	$ 416	$ 1,139	$ 775	$ 3,165	—
Other Metal Cutting								
Units	8,833	1,630	2,274	368	194	2,213	272	105
Value	$143,007	$ 54,769	$ 41,307	$ 9,524	$ 8,952	$ 5,004	$ 5,023	$ 3,256
Total Metal Forming								
Units	16,208	5,875	675	3,176	1,379	938	88	517
Value	$122,365	$ 36,256	$ 21,855	$19,826	$ 7,364	$ 4,777	$ 103	$ 5,533

Exchange Rate: 1 Pound = $1.6389.

Note: Individual items may not add to totals due to rounding.

Source: The Department of Trade and Industry.

UNITED KINGDOM IMPORTS OF NEW MACHINE TOOLS, 1986

By Type of Machine, Total and N/C; Total & Major Countries of Origin

(Values in Thousands of U.S. Dollars)

Type of Machine	Total World	West Germany	United States	Japan	Switzerland	Italy	Canada	Sweden
Grand Total (incl. N/C)								
Units	90,052	11,738	2,263	4,095	912	8,377	132	1,262
Value	$548,869	$162,278	$70,612	$106,191	$45,432	$33,400	$29,676	$18,484
Boring (incl. N/C)								
Units	560	120	41	51	43	89	—	3
Value	$ 32,992	$ 11,270	$ 2,169	$ 8,391	$ 3,532	$ 2,677	—	$ 38
Boring, N/C								
Units	116	41	10	33	9	14	—	—
Value	$ 24,029	$ 8,771	$ 1,384	$ 7,203	$ 2,945	$ 1,520	—	—
Drilling (incl. N/C)								
Units	14,998	379	158	55	20	134	11	158
Value	$ 15,098	$ 5,517	$ 2,253	$ 609	$ 521	$ 491	$ 23	$ 188
Drilling, N/C								
Units	18	14	39	1	—	—	—	—
Value	$ 2,417	$ 1,847	$ 2,253	$ 33	—	—	—	—
Gear Cutting & Finishing (incl. N/C)								
Units	66	12	39	2	2	4	—	—
Value	$ 6,952	$ 2,305	$ 2,503	$ 447	$ 229	$ 877	—	—
Gear Cutting & Finishing, N/C								
Units	8	6	—	2	—	—	—	—
Value	$ 2,175	$ 1,728	—	$ 447	—	—	—	—
Grinding & Polishing (incl. N/C)								
Units	43,661	4,026	779	1,226	122	2,356	39	328
Value	$ 78,312	$ 31,561	$11,679	$ 4,474	$13,107	$ 4,238	$ 30	$ 3,511
Grinding & Polishing, N/C								
Units	871	31	17	15	9	10	—	5
Value	$ 19,326	$ 7,378	$ 2,795	$ 2,425	$ 2,219	$ 1,990	—	$ 1,394
Lathes, N/C)								
Units	3,180	388	206	490	62	230	1	343
Value	$114,099	$ 28,137	$16,906	$ 36,534	$ 3,752	$ 5,295	$ 2	$ 7,729
Lathes, N/C								
Units	1,149	168	132	471	11	22	—	31
Value	$ 91,620	$ 21,083	$16,286	$ 35,758	$ 1,768	$ 2,238	—	$ 6,150
Milling (incl. N/C)								
Units	1,628	274	21	47	22	49	13	28
Value	$ 30,236	$ 12,579	$ 921	$ 2,381	$ 1,033	$ 1,701	$ 11	$ 505
Milling, N/C								
Units	213	74	18	34	3	12	—	2
Value	$ 17,860	$ 9,615	$ 910	$ 2,150	$ 382	$ 981	—	$ 279
Other Metal Cutting								
Units	12,142	2,039	286	1,408	117	3,619	22	82
Value	$169,370	$ 41,082	$26,515	$ 41,669	$ 8,857	$ 9,063	$29,191	$ 343
Total Metal Forming								
Units	13,817	4,500	733	816	524	1,896	46	320
Value	$101,810	$ 29,827	$ 7,666	$ 11,686	$14,401	$ 9,058	$ 419	$ 6,170

Exchange Rate: 1 Pound = $1.467.

Source: The Department of Trade and Industry.

SPANISH IMPORTS AND EXPORTS OF MACHINE TOOLS

By Type of Machine, Units and Value, 1986 to Date

(Thousands of U.S. Dollars)

	1986		1987		1988	
Type of Machine	Units	Value	Units	Value	Units	Value
TOTAL IMPORTS	29,855	$105,817	226,291	$250,656	184,904	$311,641
Metal Cutting Total	23,521	61,281	140,412	158,283	88,358	184,227
Lathes	644	14,789	1,066	25,819	1,866	41,609
Boring Machines	87	1,033	65	11,671	105	3,439
Milling Machines	246	3,137	670	6,076	1,875	14,075
Drilling Machines	2,483	2,745	31,413	24m367	11,065	5,139
Grinding & Polishing Machines	16,096	13,671	42,717	35,291	27,391	34,609
Machining Centers	(a)	11,827	145	17,708	232	36,835
Other Metal Cutting	3,965	14,079	64,336	37,351	45,824	48,521
Metal Forming Total	6,334	44,536	85,879	92,372	96,546	127,414
Presses	363	9,093	671	24,121	2,280	20,807
Forging & Stamping Machines	33	7,454	5,196	14,751	423	21,609
Other Metal Forming	5,938	27,989	80,012	53,500	93,843	84,998
TOTAL EXPORTS	31,276	$178,681	84,786	$218,842	347,664	$260,200
Metal Cutting Total	12,279	142,506	55,371	172,165	55,088	194,321
Lathes	1,600	24,967	1,708	28,905	1,505	36,950
Boring Machines	85	9,067	105	7,163	126	6,949
Milling Machines	5,270	65,728	44,578	81,151	7,039	85,648
Drilling Machines	1,763	7,395	1,421	6,778	5,088	6,930
Grinding & Polishing Machines	841	14,201	3,868	19,418	25,171	23,528
Machining Centers	(b)	6,044	67	10,145	153	13,464
Other Metal Cutting	2,720	15,104	3,624	18,605	16,006	20,852
Metal Forming Total	18,997	36,175	29,415	46,677	292,576	65,880
Presses	840	13,487	812	18,634	55,337	14,040
Forging & Stamping Machines	29	953	44	725	45	2,450
Other Metal Forming	18,128	21,735	28,559	27,318	237,194	49,390

(a) - Included in "Other Metal Cutting" Imports.
(b) - Included in "Other Metal Cutting" Exports.

Source: Asiciacion Espanola de Fabricantes de Maquinas-Herramienta.

SPANISH IMPORTS AND EXPORTS OF MACHINE TOOLS

By Origin and Destination, 1985 to 1987 (a)

(Thousands of U.S. Dollars)

	Imports			Exports		
Country	1985	1986	1987	1985	1986	1987
GRAND TOTAL	$58,895	$105,817	$250,656	$113,261	$178,681	$218,842
Australia	—	1	—	3,009	2,801	2,891
Belgium-Luxembourg	912	1,283	6,395	1,814	3,990	4,028
Canada	20	85	—	3,113	3,882	3,699
Columbia	—	—	—	1,905	3,683	2,882
Cuba	—	—	—	1,885	4,179	7,583
Denmark	411	794	—	1,084	2,489	2,089
Finland	77	75	—	1,463	3,574	2,837
France	5,635	6,073	28,005	8,197	17,383	22,869
Hong Kong	1	4	—	1,323	2,925	2,753
India	—	—	—	2,817	1,554	4,089
Italy	9,098	19,148	44,842	2,397	6,553	11,222
Japan	5,851	15,667	25,099	—	—	—
Mexico	6	—	—	4,126	4,051	3,400
Netherlands	139	439	—	2,521	7,472	9,067
Portugal	210	467	—	3,238	7,306	12,927
South Africa	—	1	—	3,096	1,292	1,964
Sweden	2,052	887	—	3,118	5,610	7,508
Switzerland	4,497	8,905	17,626	1,566	3,080	4,052
United Kingdom	4,752	6,775	35,798	6,626	12,626	13,031
U.S.A.	4,165	5,051	7,375	15,981	20,643	17,092
Venezuela	—	—	—	3,919	3,411	4,256
West Germany	17,529	34,134	57,977	15,706	32,048	39,344
All Other	3,540	6,028	27,539	24,387	28,129	11,617

(a) Countries without data are included in "All Other."

Source: Asociacion Espanola de Fabricentes de Maquinas-Hermonienta.

SPANISH MACHINE TOOL EMPLOYMENT AND CONSUMPTION

Employment in Thousands, Values in Thousands of Dollars

1974 to 1987

Year	Shipments	Imports	Exports	Consumption	Employment
1974	$206,873	$135,009	$ 69,789	$272,093	12.2
1975	223,117	168,693	86,532	305,277	11.6
1976	183,600	132,679	90,811	225,468	11.0
1977	190,872	91,373	102,529	179,716	10.5
1978	232,185	90,072	147,579	176,823	10.3
1979	315,829	91,322	210,766	196,385	10.0
1980	352,849	103,196	228,268	227,777	9.5
1981	319,957	142,038	207,038	254,957	8.8
1982	260,226	176,697	175,525	261,398	8.5
1983	188,245	86,244	99,427	175,063	7.6
1984	211,495	56,133	113,261	154,364	7.3
1985	252,881	58,895	151,452	160,324	7.3
1986	396,287	105,817	178,681	323,423	7.6
1987	574,992	250,656	218,842	606,806	7.7

Source: Asociacion Espanola de Fabricantes de Maquinas-Herramienta.

FRENCH PRODUCTION OF METAL CUTTING MACHINE TOOLS

By Type of Machine, Units and Value, 1986 to Date

(Values in Thousands of U.S. Dollars)

Type of Machine	1986		1987		1988	
	Units	Value	Units	Value	Units	Value
Engine & Turret Lathes, NC	435	$50,005	361	$40,456	333	$43,094
Turning Centers, NC	78	6,757	28(d)	4,691(d)	40	5,756
Other Lathes, NC	155(c)	39,626(c)	204(c)	38,700(c)	244	45,472
Engine Lathes, non-NC	580	13,038	327	10,199	215	8,485
Single-Spindle Automatic Lathes, non-NC	36	1,092	(a)	(a)	(a)	(a)
Other Lathes, non-NC	25	1,633	(a)	(a)	(a)	(a)
Comb. Boring & Milling Machines	(a)	(a)	(a)	(a)	(a)	(a)
Boring Machines	(a)	(a)	(a)	(a)	(a)	(a)
Milling Machines, NC	369(b)	70,141(b)	297	47,426	399	74,221
Knee-Type Milling Machines, non-NC	454	12,911	228	8,854	107	3,993
Bed-Type Milling Machines, non-NC	63	2,523	297	6,324	60	4,510
Other Milling Machines, non-NC	508	6,299				
Drilling Machines, NC	(a)	(a)	(a)	(a)	—	—
Comb. Drilling & Boring Machines, NC	(a)	(a)	(a)	(a)	(a)	(a)
Radial Drilling Machines, non-NC	81	902	39	244	(a)	(a)
Bench Type Drilling Machines, non-NC	2,301	2,932	1,738	2,744	1,692	2,694
Pillar Type Driling Machines, non-NC	987	3,117	570	1,956	626	2,405
Column Type Drilling Machines, non-NC	(a)	(a)	(a)	(a)	(a)	(a)
Grinding Machines, NC	13	2,710	7	1,129	(a)	(a)
Universal Tool & Cutter Grinding Machines, non-NC	3,127	4,295	3,067	3,033	3,461	3,259
Single Point Cutting Tool Sharpening Machines, non-NC						
Cutter Sharpening Machines, non-NC						
Other Tool & Cutter Grinding Machines, non-NC						
Universal Cylindrical Grinding Machines, non-NC	37	1,457	421	10,374	179	5,829
Internal Cylindrical Grinding Machines, non-NC	425	2,710				
External Cylindrical Grinding Machines, non-NC						
Surface Grinding Machines, non-NC						
Other Grinding Machines, non-NC						
Screw Cutting Machines, non-NC	—	—	—	—	—	—
Tapping Machines, non-NC	219	421	(a)	(a)	(a)	(a)
Planing Machines, non-NC	—	—	—	—	—	—
Slotting & Shaping Machines, non-NC	(a)	(a)	(a)	(a)	(a)	(a)
Surfacing Machines, non-NC	8,775	2,625	5,921	2,379	6,114	3,375
Polishing, Honing & Lapping Machines, non-NC	211	3,180	323	3,934	300	1,800
Broaching Machines, non-NC	(a)	(a)	(a)	(a)	(a)	(a)
Gear Cutting Machines, non-NC	—	—	—	—	—	—
Sawing & Cut-Off Machines, non-NC	738	3,345	777	3,558	852	4,489
Band Sawing Machines, non-NC	330	2,766	384	4,060	458	3,872
Other Sawing or Cut-Off Machines, non-NC	(a)	(a)	593	2,516	542	2,293
Spark Erosion Machines, non-NC	310	4,974	230	5,396	118	4,084
Transfer Lines	157	66,214	455	112,154	475	134,935
Unit Heads	586	2,584				
Machining Centers	263	44,698	265	46,672	256	52,316
Other Metal Cutting Machines, NC	220	43,438	786	96,021	1,164	93,811
Other Metal Cutting Machines, non-NC	9,801	35,463	8,958	78,305	9,100	61,328
Total Metal Cutting, NC	1,876	334,041	2,259	394,299	2,641	468,894
TOTAL METAL CUTTING	32,918	471,304	27,416	556,058	27,821	602,692

(a) Data withheld.
(b) Does not include "Other Milling Machines, NC."
(c) "Vertical Boring & Turning Mills, NC" are included in "Other Lathes, NC."
(d) Does not include "Vertical Turning Centers, NC."

Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associee.

FRENCH PRODUCTION OF METAL FORMING MACHINE TOOLS

By Type of Machine, Units and Value, 1986 to Date

(values in Thousands of U.S. Dollars)

Type of Machine	1986		1987		1988	
	Units	Value	Units	Value	Units	Value
Sheet Metal Bending Machines, non-NC	176	$ 2,036	60	$ 1,662	26	$ 1,407
Sheet Metal Folding Machines, non-NC	1,065	2,625	722	1,411	(a)	(a)
Sheet Metal Straightening Machines, non-NC	238	2,080	(a)	(a)	(a)	(a)
Bar & Tube Drawing Machines, non-NC	—	—	(a)	(a)	(a)	(a)
Straightening Machines, non-NC	—	—	—	—	(a)	(a)
Profiling, Flanging & Molding Machines, non-NC	80	2,474	70	2,724	83	3,440
Other Bending Machines, non-NC	149	607	130	518	(a)	(a)
Punching, Shearing & Comb. Punching & Shearing Machines, NC	(a)	(a)	(a)	(a)	242	2,997
Mechanical Shearing Machines, non-NC	84	948	11	260	68	697
Hydraulic Shearing Machines, non-NC	(a)	(a)	578	12,018	887	18,523
Other Shearing Machines, non-NC	1,040	8,478	941	8,175	992	9,154
Punching Machines, non-NC	104	1,124	(a)	(a)	42	441
Comb. Punching & Shearing Machines, non-NC	(a)	(a)	(a)	(a)	(a)	(a)
Wireworking Machines, non-NC	64	3,013	80	7,519	55	5,276
Presses, NC	(a)	(a)	(a)	(a)	(a)	(a)
Open Front Mechanical Presses, non-NC	417	6,045	348	3,103	432	2,099
Forging, Stamping & Percussion Presses, non-NC	(a)	(a)	(a)	(a)	(a)	(a)
Presses, Pneumatic	(a)	(a)	314	1,374	320	1,813
Mechanical Press Brakes, non-NC	—	—	—	—	(a)	(a)
Hydraulic Press Brakes, non-NC	376	8,944	144	4,610	383	8,069
Hydraulic Press Brakes, NC	—	—	177	8,784	495	27,282
Drop & Air Hammers, non-NC	—	—	—	—	(a)	(a)
Open Front Hydraulic Presses, non-NC	156	3,062	155	5,767	122	4,147
Other Hydraulic Presses, non-NC	170	7,372	108	5,244	70	4,713
Other Metal Forming Machines, NC	732	37,276	472	36,012	333	37,966
Other Metal Forming Machines, non-NC	1,250	27,242	1,722	41,463	1,816	59,910
Total Metal Forming, NC	732	37,276	661	45,397	1,070	68,245
TOTAL METAL FORMING	6,101	116,816	5,696	141,245	6,366	187,934

(a) Data withheld.

Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associee.

FRENCH PRODUCTION AND EXPORTS OF NC MACHINES (a)

Units and Value, 1970 to Date

(Values in Millions of U.S. Dollars)

Year	Production		Exports	
	Units	Value	Units	Value
1970	147	$ 11.0	46	$ 3.9
1971	247	25.0	83	10.5
1972	230	27.8	61	5.6
1973	389	42.7	141	12.6
1974	535	51.0	261	22.3
1975	612	75.5	217	23.7
1976	576	80.4	165	26.6
1977	579	97.6	223	52.7
1978	867	163.3	391	104.0
1979	1,068	196.1	417	94.5
1980	1,238	189.2	370	85.2
1981	1,238	208.4	NA	NA
1982	1,246	192.4	NA	NA
1983	1,295(b)	255.1(b)	NA	NA
1984	1,625(c)	225.9(c)	NA	NA
1985	D	D	NA	NA
1986	2,608	371.3	NA	NA
1987	2,920	439.7	NA	NA
1988	3,711	537.1	NA	NA

NA - Not Available. D - Withheld to avoid disclosure.

(a) The survey covered metalworking and woodworking manufacturers.
(b) Does not include Surface Grinding Machines.
(c) Does not include Spark Erosion Machines.

Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associee.

FRENCH MACHINE TOOL INDUSTRY

Selected Data, 1984 to Date

(Values in Millions of U.S. Dollars)

	1984	1985	1986	1987	1988
Employment	13,443	12,050	11,450	10,025	9,190
Production Workers	7,656	6,670	6,160	5,375	NA
Others	5,787	5,380	5,290	4,650	NA
Average Weekly Hours	38.0	38.8	NA	NA	NA
Compensation	$156.8	$149.8	$197.8	$211.3	$193.2
Wages	72.0	65.3	82.8	88.4	NA
Salaries	84.8	84.5	115.0	122.9	NA
Orders(a)	$474.0	$490.4	$613.9	$757.3	$903.2
Domestic	315.7	301.9	410.3	497.6	644.5
Foreign	158.3	188.5	203.6	259.7	258.7
Shipments(a)	$465.5	$499.3	$657.4	$766.1	$872.9

NA - Not Available.

(a) Excluding Tax.

Note: Individual items may not add to totals due to rounding.

Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associee.

FRENCH EXPORTS OF MACHINE TOOLS
By Destination, Value, 1985 to Date
(Thousands of U.S. Dollars)

Destination	1985	1986	1987	1988
TOTAL	$208,604	$308,071	$284,274	$396,136
WESTERN EUROPE				
Austria	1,706	3,166	2,326	NA
Belgium-Luxembourg	7,153	13,190	12,281	18,260
Denmark	NA	1,333	2,560	NA
Finland	NA	3,482	2,498	NA
Italy	8,780	19,004	21,223	34,322
Netherlands	3,267	5,320	5,385	8,116
Norway	1,365	3,978	1,598	NA
Portugal	1,341	2,039	3,126	NA
Spain	4,770	6,359	12,408	14,095
Sweden	2,753	3,887	4,774	5,993
Switzerland	9,116	17,993	18,844	26,494
Turkey	4,419	3,830	NA	NA
United Kingdom	12,655	16,612	17,419	38,607
West Germany	27,280	39,179	50,696	43,903
EASTERN EUROPE				
Bulgaria	1,305	1,597	NA	NA
Czechoslovakia	1,348	3,679	1,918	NA
East Germany	9,618	21,605	5,759	39,081
Poland	1,284	995	2,655	NA
U.S.S.R.	10,793	5,495	23,968	20,579
Yugoslavia	4,044	642	728	NA
NORTH AMERICA				
Canada	3,116	6,648	4,456	NA
Mexico	2,947	864	NA	NA
United States	18,813	41,028	14,954	20,881
SOUTH AMERICA				
Brazil	NA	NA	1,391	NA
ASIA				
India	5,986	2,813	2,890	NA
Indonesia	2,709	666	968	NA
Israel	NA	2,059	932	NA
Japan	NA	1,524	2,150	NA
People's Rep. of China	4,314	5,840	4,501	NA
Saudi Arabia	NA	1,332	1,098	NA
Singapore	NA	NA	880	NA
Taiwan	NA	1,422	3,734	NA
OCEANIA				
Australia	2,671	5,734	4,368	NA
AFRICA				
Algeria	13,200	24,566	13,600	12,209
Egypt	1,626	4,055	2,669	NA
Morocco	3,191	3,345	2,686	5,079
Rep.of S. Africa	NA	860	1,407	NA
Tunisia	2,108	5,431	3,598	NA
Zaire	1,263	1,528	934	NA
OTHER	33,663	24,971	26,892	108,517

NA - Not available; exports, if any, are included in "Other."

Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associee.

FRENCH IMPORTS OF MACHINE TOOLS
By Origin, Value, 1985 to Date
(Thousands of U.S. Dollars)

Destination	1985	1986	1987	1988
TOTAL	$357,549	$617,994	$738,111	$971,119
WESTERN EUROPE				
Austria	3,554	4,901	8,864	11,705
Belgium-Luxembourg	9,786	21,975	17,490	28,756
Denmark	762	1,588	2,478	NA
Finland	551	346	1,563	NA
Ireland	173	269	165	NA
Italy	64,820	119,785	152,775	166,655
Netherlands	3,461	4,663	3,776	7,198
Norway	91	444	971	NA
Portugal	186	127	392	NA
Spain	8,613	17,569	22,410	33,091
Sweden	3,900	6,532	5,309	6,114
Switzerland	51,370	91,163	108,236	125,429
United Kingdom	14,405	26,418	35,284	62,228
West Germany	111,240	182,716	225,568	295,347
EASTERN EUROPE				
Bulgaria	776	408	536	NA
Czechoslovakia	555	3,355	2,529	3,626
East Germany	2,917	7,251	6,593	6,671
Hungary	408	922	132	NA
Poland	484	2,594	1,184	NA
Rumania	1,402	1,561	1,238	NA
U.S.S.R.	1,682	1,401	2,851	3,425
Yugoslavia	73	162	144	NA
NORTH AND SOUTH AMERICA				
Canada	1,970	258	54	NA
United States	11,874	30,347	24,771	30,854
Brazil	14	82	310	NA
ASIA				
People's Rep. of China	170	701	2,230	NA
Israel	216	39	24	NA
Japan	53,685	77,474	84,627	127,205
South Korea	NA	492	799	NA
Taiwan	4,964	7,414	14,147	21,025
OTHER	3,447	5,038	10,659	41,790

NA - Not available; imports, if any, are included in "Other."

Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associee.

FRENCH FOREIGN TRADE IN MACHINE TOOLS
By Type of Machine, Value, 1985 to Date
(Thousands of U.S. Dollars)

Types of Machine	1985	1986	1987	1988
TOTAL IMPORTS	$357,549	$617,994	$738,111	$971,119
Metal Cutting Total (including NC)	261,131	461,143	548,176	758,870
Boring Machines (including NC)	19,478	31,095	26,195	37,860
Boring Machines, NC	16,455	25,555	19,311	30,678
Drilling Machines (including NC)	13,548	21,667	31,925	35,883
Drilling Machines, NC	6,873	12,411	13,967	10,779
Gear Cutting	3,485	9,804	13,840	23,713
Grinding & Polishing	46,851	80,256	117,410	131,587
Lathes (including NC)	72,191	112,513	128,506	160,991
Lathes, NC	49,370	78,314	90,674	123,407
Milling Machines (including NC)	32,630	58,420	81,142	66,267
Milling Machines, NC	21,046	37,321	52,281	44,884
Machining Centers	NA	NA	NA	176,031
Other Metal Cutting	72,949	147,388	149,156	126,538
Metal Forming Total	96,417	156,851	189,935	212,249
Hydraulic Presses, non-NC	2,837	7,481	6,230	11,412
Mechanical Presses, non-NC	16,211	26,552	27,585	19,649
Presses, NC	3,313	8,479	5,638	9,070
Forging Machines	4,254	2,925	5,890	16,539
Punching, Shearing, Bending and Forming Machines	37,477	61,799	79,885	121,107
Wire Drawing Machines	7,177	13,442	11,203	12,257
Other Metal Forming	25,150	36,173	53,504	22,215
TOTAL EXPORTS	$208,604	$308,071	$284,274	$396,136
Metal Cutting Total (including NC)	125,456	190,805	167,762	254,071
Boring Machines (including NC)	3,105	9,008	3,164	6,427
Boring Machines, NC	949	4,970	1,279	1,277
Drilling Machines (including NC)	7,810	22,762	10,779	11,811
Drilling Machines, NC	1,080	14,574	2,336	1,469
Gear Cutting	1,240	1,045	2,726	1,446
Grinding & Polishing	26,767	27,971	31,069	31,670
Lathes (including NC)	34,983	57,043	53,030	59,924
Lathes, NC	11,940	16,261	18,463	45,723
Milling Machines(including NC)	28,789	39,984	35,454	44,780
Milling Machines, NC	11,910	18,080	19,864	35,423
Machining Centers	NA	NA	NA	47,359
Other Metal Cutting	22,761	32,992	31,541	50,663
Metal Forming Total	83,148	117,266	116,512	142,065
Hydraulic Presses, non-NC	2,825	7,206	5,492	4,555
Mechanical Presses, non-NC	10,198	12,972	18,691	13,798
Presses, NC	802	2,720	8,333	16,590
Forging Machines	1,132	814	1,538	24,644
Punching, Shearing, Bending and Forming Machines	32,645	43,265	41,097	60,158
Wire Drawing Machines	2,954	3,262	4,623	8,623
Other Metal Forming	32,592	47,027	36,737	13,697

NA - Not Available.

Note: Individual items may not add to totals due to rounding.

Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associee.

ITALIAN IMPORTS AND EXPORTS OF MACHINE TOOLS

By Origin and Destination 1985 to Date

(Thousands of U.S. Dollars)

Countries	1985	1986	1987	1988
TOTAL IMPORTS	$196,449	$346,794	$ 566,484	$ 706,133
West Germany	76,673	127,448	214,847	255,618
Switzerland	39,855	72,713	103,838	111,806
United States	12,412	12,745	20,545	21,807
Japan	11,627	28,240	54,532	84,261
France	8,432	16,099	20,927	41,580
United Kingdom	7,699	18,446	29,060	38,848
Belgium-Luxemborg	3,928	13,885	17,889	20,853
East Germany	3,771	7,513	10,586	13,712
Sweden	9,794	9,056	9,154	9,112
Spain	3,352	5,970	14,767	17,448
Taiwan	1,047	2,683	10,470	21,072
U.S.S.R.	5,604	6,439	8,205	8,935
Czechoslovakia	2,200	5,098	8,528	15,217
Netherlands	4,190	2,683	5,361	7,676
Austria	890	6,507	18,067	9,206
Other Imports	4,975	11,269	19,708	28,982
TOTAL EXPORTS	$707,395	$969,681	$1,048,529	$1,309,382
West Germany	103,121	139,791	156,956	155,259
United States	94,113	129,528	85,944	107,502
France	64,628	118,728	136,287	161,015
U.S.S.R.	42,422	73,115	77,197	126,820
Turkey	35,351	14,288	19,686	25,242
United Kingdom	31,266	42,729	38,270	54,626
Switzerland	21,787	41,588	53,178	46,335
Netherlands	10,422	15,093	16,731	15,678
Yugoslavia	6,128	13,617	13,834	11,271
Bulgaria	8,537	10,196	(a)	(a)
Algeria	15,450	16,837	16,265	(a)
China	26,396	47,693	28,531	28,622
Sweden	12,517	19,050	27,099	31,941
Belgium-Luxemborg	13,355	21,800	19,145	26,833
Austria	9,532	18,514	19,740	19,450
Spain	10,527	20,123	53,210	72,216
Greece	7,437	10,464	9,192	12,109
Poland	10,422	10,464	9,911	12,103
Egypt	7,646	9,458	(a)	(a)
Canada	24,301	28,642	16,206	22,648
Other Exports	152,037	167,963	267,877	379,712

(a) Included in "Other Exports."

Note: Individual items may not add to totals due to rounding.

Source: Unione Costruttori Italiani Macchine Utensili

ITALIAN EXPORTS OF MACHINE TOOLS
1985 to Date
(Thousands of U.S. Dollars)

Machine Classifications	1985	1986	1987	1988
TOTAL	$707,395	$969,679	$1,048,529	$1,309,382
Lathes	75,305	77,106	95,424	130,106
Boring Machines	34,046	43,962	36,140	53,223
Milling Machines	92,515	148,005	126,521	115,329
Drilling Machines	27,954	32,352	35,911	66,716
Broaching Machines	6,424	3,424	6,712	6,501
Grinding Machines	58,431	86,442	100,843	119,588
Gear Cutting Machines	2,213	6,515	8,521	15,584
Shaping-Slotting Machines	NA	NA	1,769	1,699
Sawing-Cutting Off Machines	26,119	37,206	46,077	51,667
Presses	62,035	100,963	123,571	145,967
Shears and Punching Machines	25,652	44,702	35,182	51,747
Bending Machines	29,207	38,980	47,712	6,379
Forging Machines	10,281	12,999	9,389	26,112
All Others	257,213	337,024	374,756	518,764

NA - Not Available.

Note: Individual items may not add to totals due to rounding.

Source: Unione Costruttori Italiani Macchine Utensili.

ITALIAN IMPORTS OF MACHINE TOOLS
1985 to Date
(Thousands of U.S. Dollars)

Machine Classifications	1985	1986	1987	1988
TOTAL	$196,449	$346,810	$566,484	$706,133
Lathes	34,695	73,481	118,929	132,980
Boring Machines	7,950	9,431	17,888	19,731
Milling Machines	19,182	38,192	70,504	67,919
Drilling Machines	5,304	16,151	22,318	15,671
Broaching Machines	(a)	(a)	312	592
Grinding Machines	24,780	29,249	51,181	52,412
Gear Cutting Machines	3,706	7,706	16,479	16,815
Shaping-slotting Machines	(a)	(a)	2,305	531
Sawing-Cutting Off Machines	7,846	12,946	14,859	12,898
Presses	11,099	23,308	29,345	45,705
Shears and Punching Machines	9,476	13,253	30,151	45,129
Bending Machines	6,313	8,648	13,981	2,422
Forging Machines	906	1,410	6,233	15,697
All Others (a)	65,192	113,466	171,998	277,631

(a) Included in "All Others."

Note: Individual items may not add to totals due to rounding.

Source: Unione Costruttori Italiani Macchine Utensili.

ITALIAN PRODUCTION, IMPORTS, EXPORTS AND CONSUMPTION OF MACHINE TOOLS

1973 to Date

(Values in Millions of U.S. Dollars)

Year	Production	Imports	Exports	Consumption
1973	$ 620.9	$187.0	$ 236.4	$ 571.5
1974	891.8	261.5	322.5	830.8
1975	842.5	212.9	432.1	623.3
1976	750.9	160.5	359.0	552.4
1977	878.3	192.9	442.4	628.8
1978	1,060.5	195.0	596.3	659.2
1979	1,354.0	255.9	689.0	920.9
1980	1,728.1	356.4	847.6	1,236.9
1981	1,539.4	300.3	795.2	1,044.5
1982	1,138.6	208.6	639.9	707.3
1983	1,037.0	181.8	603.4	615.4
1984	996.0	182.5	558.0	620.5
1985	1,115.5	196.4	707.4	604.5
1986	1,624.6	346.8	969.7	1,001.7
1987	2,235.2	566.5	1,048.5	1,753.2
1988	2,792.7	706.1	1,309.4	2,189.4
1989 F	3,028.4	765.8	1,496.8	2,297.4

F - Forecast.

Source: Unione Costruttori Italiani Macchine Utensili.

SWEDISH PRODUCTION, IMPORTS, AND EXPORTS OF MACHINE TOOLS

Cutting & Forming, By Type of Machine, 1986 to date

(Thousands of U.S. Dollars)

	Production			Imports			Exports		
Machine Classification	1986	1987	1988	1986	1987	1988	1986	1987	1988
GRAND TOTAL	$299,072	$328,016	NA	$288,749	$387,358	$417,365	$238,306	$275,891	$309,497
Total Metal Cutting	131,846	133,915	NA	173,440	222,816	248,975	96,627	120,553	121,423
Drilling Machines	14,774	16,599	NA	5,999	10,196	9,170	12,746	10,775	10,777
Gear Cutting Machines	—	—	NA	819	6,754	2,540	217	515	102
Grinding and Polishing	57,810	60,862	NA	25,541	32,902	34,529	43,153	65,700	63,541
Lathes	31,034	28,281	NA	46,928	56,052	64,911	28,811	21,926	19,199
Milling Machines	26,915	36,087	NA	36,087	37,503	33,579	11,932	19,024	8,606
Broaching Machines	—	—	NA	984	945	1,156	46	44	237
Planers and Shapers	—	—	NA	493	482	1,016	75	29	908
Other Metal Cutting Machine	1,312	1,056	NA	56,589	77,982	102,072	2,645	2,541	18,053
Total Metal Forming	78,879	89,077	NA	55,820	89,532	91,494	64,977	72,197	92,280
Hammers incl. Other Forging	1,072	1,297	NA	605	1,325	2,176	534	1,309	6,390
Presses	20,725	23,589	NA	8,757	22,823	11,949	24,327	19,540	30,778
Punching and Shearing Machines	10,307	11,516	NA	23,383	27,093	33,549	16,331	22,454	29,936
Other Metal Forming Machines	47,225	52,676	NA	23,075	38,291	43,820	23,785	28,894	25,176
Parts and Accessories	88,347	105,025	NA	59,490	75,010	76,896	73,702	83,141	95,794

NA - Not Available.

Source: The Swedish Machine Tool Manufacturers' Association.

SWEDISH IMPORTS AND EXPORTS OF MACHINE TOOLS

By Country, 1985 to Date

(Thousands of U.S. Dollars)

	Imports			Exports		
Country	1986	1987	1988	1986	1987	1988
TOTAL	$229,260	$312,348	$340,469	$164,603	$192,751	$213,703
Europe	175,909	240,780	260,371	117,929	137,206	155,535
Austria	6,701	4,131	2,763	3,434	2,610	2,383
Belgium	3,871	4,962	6,140	2,279	2,488	2,733
Denmark	8,909	8,294	11,264	13,101	8,732	13,266
Finland	4,095	6,299	6,866	7,401	11,029	11,958
France	2,920	4,244	7,319	5,655	5,253	10,454
Italy	16,518	40,951	36,430	10,613	10,683	7,254
Netherlands	4,465	5,271	5,532	4,545	4,403	4,662
Norway	758	1,728	2,341	9,446	12,073	7,832
Portugal	122	846	639	481	386	576
Spain	5,991	9,091	8,460	526	1,253	2,120
Switzerland	22,453	22,577	23,417	3,619	4,314	3,722
United Kingdom	9,279	17,417	11,173	21,162	20,790	24,276
West Germany	82,508	103,080	127,664	26,685	39,589	35,455
East European Bloc	9,011	11,451	9,931	5,515	11,294	23,050
Czechslovakia	4,503	4,901	4,124	181	914	2,180
U.S.S.R.	757	609	581	777	2,439	6,831
Other East Bloc(a)	3,751	5,941	5,226	4,557	7,941	14,039
All Other Europe	308	436	392	3,473	2,306	5,794
United States	4,341	8,886	4,886	22,257	25,978	27,650
Canada	168	347	71	3,070	3,597	3,782
South & Central America	52	17	164	1,205	7,346	1,459
Japan	45,939	53,419	62,306	1,036	586	2,474
China	179	502	242	7,577	2,581	4,268
Taiwan	2,207	7,180	11,110	129	369	1,087
All Other Asia	417	1,217	1,120	7,882	10,033	11,622
Africa	—	—	—	2,241	2,363	1,494
All Other	48	1	199	1,276	2,690	4,332

(a) Includes Bulgaria, GDR, Hungary, Poland and Romania.

Note: Individual items may not add to totals due to rounding.

Source: The Swedish Machine Tool Manufacturers' Association.

NUMBER OF COMPANIES AND EMPLOYEES IN THE SWEDISH MACHINE TOOL INDUSTRY

	1983	1984	1985	1986	1987	1988
Number of Companies	36	35	36	33	33	33
Number of Employees	3,000	3,000	3,070	3,100	3,000	3,000

Source: The Swedish Machine Tool Manufacturers' Association.

SWISS EXPORTS AND IMPORTS OF MACHINE TOOLS
1985 to Date(a)
(Thousands of U.S. Dollars)

	Exports			Imports		
	1985	1986	1987	1985	1986	1987
GRAND TOTAL	$836,292	$1,259,912	$1,435,756	$170,032	$313,164	$360,113
Argentina	1,598	3,085	NA	—	—	NA
Australia	7,049	7,396	NA	—	4	NA
Austria	14,995	21,218	NA	3,919	5,647	5,700
Belgium-Luxembourg	7,611	13,792	NA	1,201	3,190	NA
Brazil	3,413	9,941	NA	—	41	NA
Bulgaria	19,408	42,373	44,394	20	67	NA
Canada	8,971	14,120	NA	27	27	NA
People's Rep. of China	26,272	51,768	35,072	—	1	NA
Czechoslovakia	17,714	24,509	NA	998	1,972	NA
Denmark	7,200	10,663	NA	936	1,563	NA
East Germany	3,314	12,537	72,800	208	380	NA
Finland	2,903	8,231	NA	96	148	NA
France	49,790	94,467	113,130	8,714	17,614	18,710
Hungary	2,433	2,970	NA	206	496	NA
India	13,583	19,485	NA	127	124	NA
Indonesia	421	2,710	NA	—	—	NA
Iran	3,474	9,158	NA	—	2	NA
Israel	4,042	6,015	NA	68	233	NA
Italy	45,694	72,970	103,809	20,430	35,011	47,546
Japan	62,665	53,977	47,277	27,460	48,684	48,619
Mexico	6,675	5,383	NA	61	—	NA
Netherlands	13,182	19,800	NA	1,117	3,860	3,755
Pakistan	2,113	1,622	NA	—	—	NA
Poland	10,008	12,554	NA	15	12	NA
South Africa	3,341	3,714	NA	44	168	NA
Spain	6,255	11,828	NA	1,956	2,928	4,158
Sweden	13,875	26,376	NA	2,074	3,740	NA
Taiwan	4,561	5,574	NA	518	3,936	7,846
United Kingdom	38,996	48,821	36,749	5,393	7,019	7,511
United States	123,453	134,419	119,166	5,253	5,325	3,822
U.S.S.R.	61,302	84,910	108,235	557	1,522	NA
West Germany	187,720	342,791	394,313	87,990	168,078	193,737
Yugoslavia	3,968	15,777	NA	5	20	NA
All Other	58,293	64,958	NA	639	1,352	NA

NA - Not Available.

Exchange Rate: 1985 $1 = 2.4571 Swiss Francs; 1986 $1 = 1.7989 Swiss Francs; 1987 $1 = 1.4912 Swiss Francs.

Note: Individual items may not add to totals due to rounding.

Source: Verein Schweizerischer Maschinen-Industrieller.

NETHERLANDS SALES OF MACHINE TOOLS AND PARTS

By Machine Types, 1983 to Date

(Thousands of U.S. Dollars)

Type of Machine	1983	1984	1985	1986	1987(r)	1988(p)
GRAND TOTAL	$29,326	$34,406	$50,791	$73,755	$56,502	$86,306
Metal Cutting Machine Tools	12,894	17,827	28,753	45,102	30,936	33,227
Metal Forming Machine Tools	12,158	12,248	13,909	18,775	16,256	33,215
Hydraulic Presses	1,261	1,870	933	1,510	4,532	NA
Mechanical Presses			1,054	1,020		
Bending, Forming, Straightening, Cutting & Edging	6,061	4,488	4,275	5,347	2,512	7,203
Other Metal Forming	4,835	5,890	7,647	10,898	9,212	26,013
Machine Tool Parts & Accessories	4,275	4,332	8,129	9,878	9,310	19,864

p - Preliminary. r - Revised.

Note: Individual items may not add to totals due to rounding.

Source: Vereniging Van Metaal-Industrieen.

The classification of machine tools in the official Dutch Statistics have changed. As a result, the 1988 production numbers do not correspond to the figures from previous years.

NETHERLANDS IMPORTS AND EXPORTS OF MACHINE TOOLS AND PARTS

By Type of Machine, 1986 to Date

(Thousands of U.S. Dollars)

	Imports			Exports		
Type of Machine	1986	1987	1988	1986	1987	1988
TOTAL	$326,735	$321,073	$389,043	$162,204	$172,661	$281,870
Lathes	38,204	43,015	39,242	7,306	9,933	13,007
Milling Machines	60,898	59,978	48,675	27,224	23,422	13,367
Grinding, Honing and Polishing Machines	22,163	42,483	26,082	28,694	24,683	27,079
Hydraulic Presses	11,102	2,440	7,141	7,837	1,054	4,274
Other Presses	6,000	17,457	11,079	3,061	10,637	5,678
Bending, Forming, Straightening, Cutting and Edging Machines	42,327	39,364	53,010	30,531	37,457	47,241
Other Metalworking Machine Tools	44,490	31,008	61,859	9,306	11,109	36,490
Parts and Accessories	101,551	85,328	141,955	48,245	54,366	134,734

Note: Individual items may not add to totals due to rounding.

Source: Vereniging Van Mataal-Industrieen.

The classification of machine tools in the official Dutch Statistics have changed. As a result, the 1988 foreign trade numbers do not correspond directly to the figures from previous years.

1988 CANADIAN IMPORTS AND EXPORTS OF MACHINE TOOLS
To the United States and the World
By Type of Machine
(Values in Thousands of U.S. Dollars)

TOTAL IMPORTS FROM:	United States		World	
Machine Classification	Units	Value	Units	Value
Metal Cutting	26,424	$138,823	88,156	$320,092
Electrical Discharge Machines	243	18,177	508	26,820
Machining Centers	193	20,872	524	60,241
Lathes	1,408	22,142	3,236	67,972
Drilling Machines	3,155	5,217	30,286	13,137
Boring-Milling Machines	87	2,897	208	7,929
Boring Machines, n.e.s.	206	6,105	318	11,268
Milling Machines	497	9,504	1,616	31,918
Griding Machines	7,292	23,602	25,844	52,830
Gear Cutting Machines	76	1,179	103	2,712
Sawing Machines	6,127	8,052	17,667	17,735
Other Metal Cutting	7,140	21,074	7,846	27,530
Metal Forming	8,761	65,855	12,776	175,223
Forging or Die Stamping	268	8,095	373	26,537
Bending, Folding Straightening or Flattening	2,018	20,015	3,117	29,593
Punching and Shearing	1,014	16,160	1,560	32,892
Hydraulic Presses	1,533	5,213	2,903	41,798
Presses, n.e.s.	403	7,308	507	24,781
Other Metal Forming	3,525	9,064	4,316	19,622
Total Machine Tools	35,185	204,678	100,932	495,315

TOTAL EXPORTS TO:	United States		World	
Machine Classification	Units	Value	Units	Value
Metal Cutting	4,743	$15,815	6,816	$22,299
Machining Centers	9	774	12	1,043
Lathes	421	2,040	470	2,283
Milling Machines	305	2,759	463	3,528
Grinding Machines	729	1,724	1,019	2,447
Sawing Machines	296	2,334	523	1,940
Other Metal Cutting	2,983	6,184	4,329	11,058
Metal Forming	20,238	33,596	20,791	44,997
Forging or Die Stamping	73	3,372	79	3,714
Bending, Folding Straightening or Flattening	19,148	9,021	19,277	10,975
Punching and Shearing	230	3,968	243	5,225
Hydraulic Presses	61	2,525	72	2,902
Presses, n.e.s.	342	6,961	513	9,833
Other Metal Forming	384	7,749	607	12,348
Total Machine Tools	24,981	49,411	27,607	67,296

Source: Statistics Canada.

THE INDIAN MACHINE TOOL INDUSTRY
Production and Exports
(Values in Thousands of U.S. Dollars)

	Production						Exports	
	1986		1987		1988		1988	
Type of Machine	Unit	Value	Unit	Value	Unit	Value	Unit	Value
Total Machine Tools	9,284	$158,119	9,272	$153,750	10,396	$196,522	1,014	$22,131
Boring machines	86	9,904	69	7,988	75	9,341	1	129
Drilling machines	1,563	8,599	1,249	11,400	1,300	7,545	27	345
Milling machines	1,173	18,445	1,254	16,825	1,250	19,760	170	2,730
Gear cutting machines	45	2,018	36	2,945	50	3,233	19	1,617
Broaching machines	21	1,275	16	825	10	1,581	(a)	(a)
Lapping, honing, polishing machines	48	95	98	833	15	72	(a)	(a)
Machining centers	(a)	(a)	41	6,525	68	20,407	(a)	(a)
Automatic screw machines	663	15,674	554	15,751	525	12,215	240	4,994
Lathes	3,401	41,018	3,093	35,852	3,500	25,149	273	2,551
Grinding machines	888	13,404	1,198	16,543	1,900	23.353	225	6,884
Sawing machines	253	1,013	196	864	160	287	3	14
Shaping machines	145	2,093	127	2,036	65	575	4	201
Slotting machines	35	513	70	1,496	10	72	3	108
Screwing & threading	50	795	58	961	100	1,150	12	86
Presses	373	15,652	463	12,326	450	12,933	8	65
Shearing & sheet metal	172	5,190	160	4,934	110	2,515	(a)	(a)
Other	368	22,432	590	15,646	808	56,334	28	2,407

(a) Included in "Other."

Source: Indian Machine Tool Manufacturers' Association (IMTMA).

TAIWAN'S PRODUCTION, IMPORTS, EXPORTS AND CONSUMPTION OF MACHINE TOOLS

By Type of Machine, 1988

(Thousands of U.S. Dollars)

Machine Classification	Production	Imports	Exports	Consumption
Grand Total	$759,342	$328,651	$489,711	$598,282
Lathes	157,477	19,147	110,234	66,390
Drilling Machines	80,909	16,549	72,818	24,640
Milling Machines	84,151	21,254	58,906	46,499
Grinding Machines	81,075	31,893	63,259	49,709
Sawing Machines	32,988	2,807	23,091	12,704
Shaping & Planing Machines	1,594	985	1,116	1,463
Boring Machines	3,294	6,702	2,306	7,690
Machining Centers	95,353	9,221	57,212	47,362
Gear Cutting Machines	55	6,393	33	6,415
Screw Cutting Machines	2,408	6,026	1,445	6,989
Electrical Discharge Machines	37,804	19,436	26,463	30,777
Presses	91,442	92,488	27,433	156,497
Other Machinery	76,960	95,751	45,396	127,315

Consumption = Production + Imports − Exports.

Note: Individual items may not add to totals due to rounding.

Source: Taiwan Association of Machinery Industry.

TAIWAN PRODUCTION OF MACHINE TOOLS

By Type of Machine, 1984 to Date

(Values in Thousands of Dollars)

Machine Classifications	1984	1985	1986	1987	1988
Total Machines Tools	$233,2[illegible]4	$282,072	$356,706	$577,828	$759,342
Lathes	59,119	66,320	74,496	99,181	157,477
Drilling Machines	47,619	53,419	67,310	88,897	80,909
Milling Machines	36,626	38,584	47,804	68,295	84,151
Bench Grinders	0	0	0	28,238	32,533
Other Grinding Machines	18,827	43,772	59,795	36,724	48,541
Sawing Machines	13,396	15,030	18,587	24,357	32,988
Shaping & Planing Machines	2,391	2,682	905	1,526	1,594
Boring Machines	584	1,071	2,318	5,229	3,294
Machining Centers	15,180	17,029	40,458	64,878	95,353
Gear Cutting Machines	214	240	301	193	55
Screw Cutting Machines	0	0	0	2,115	2,408
Electrical Discharge Machines	0	0	0	16,225	37,804
Other Metal Cutting Machines	15,883	17,726	14,549	46,740	13,832
Presses (Punching & Shearing)	7,767	24,181	27,596	46,964	91,442
Other Metal Forming Machines	15,626	2,019	2,587	48,266	76,960

Note: Individual items may not add to totals due to rounding.

Source: Taiwan Association of Machinery Industry.

TAIWAN IMPORTS AND EXPORTS OF MACHINE TOOLS
By Type of Machine, 1984 to Date
(Values in Thousands of Dollars)

Machine Classifications	1984	1985	1986	1987	1988
TOTAL IMPORTS	$113,273	$76,678	$82,454	$214,838	$328,651
Lathes	10,835	7,608	7,795	15,830	19,147
Drilling Machines	4,932	6,985	5,612	16,419	16,549
Milling Machines	15,173	7,433	3,842	19,410	21,254
Grinding Machines	12,510	9,143	13,832	24,130	31,893
Sawing Machines	631	666	626	1,209	2,807
Shaping & Planing Machines	880	371	237	512	985
Boring Machines	1,872	1,662	2,037	3,129	6,702
Machining Centers	0	0	3,877	3,447	9,221
Gear Cutting Machines	2,587	2,413	1,114	7,902	6,393
Screw Cutting Machines	0	0	0	3,484	6,026
Electrical Discharge Machines	0	0	0	15,261	19,436
Other Metal Cutting Machines	18,301	15,927	17,053	12,352	23,263
Presses (Punching & Shearing)	45,551	24,470	26,428	30,956	92,488
Other Metal Forming Machines	0	0	0	60,798	72,487
TOTAL EXPORTS	$164,802	$204,464	$254,162	$379,926	$489,711
Lathes	44,406	46,746	60,080	69,426	110,234
Drilling Machines	48,223	43,332	54,282	62,228	72,818
Milling Machines	27,856	25,917	34,651	47,806	58,906
Bench Grinders	0	0	0	25,414	29,280
Other Grinding Machines	12,375	35,559	44,132	25,707	33,979
Sawing Machines	10,208	11,740	14,168	17,050	23,091
Shaping & Planing Machines	386	832	854	1,068	1,116
Boring Machines	417	765	1,552	3,660	2,306
Machining Centers	9,985	13,165	33,715	38,927	57,212
Gear Cutting Machines	5	156	151	116	33
Screw Machines	0	0	0	1,269	1,445
Electrical Discharge Machines	0	0	0	11,358	26,463
Other Metal Cutting Machines	8,723	8,980	3,677	32,718	6,916
Presses (Punching & Shearing)	2,217	17,272	6,899	9,393	27,433
Other Metal Forming Machines	0	0	0	33,786	38,480

Note: Individual items may not add to totals due to rounding.

Source: Taiwan Association of Machinery Industry.

KOREAN PRODUCTION OF MACHINE TOOLS
By Type, 1979 to 1988
(Millions of Dollars)

Machine Classifications	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
GRAND TOTAL	$113.9	$92.3	$99.0	$124.8	$167.9	$219.9	$179.0	$334.3	$530.9	$622.2
Metal Cutting Total	58.8	59.5	65.0	78.0	103.6	128.3	144.8	214.8	393.5	472.8
Lathes	36.9	41.0	35.0	32.0	37.6	46.5	40.2	46.1	64.6	84.2
NC Lathes	—	—	4.0	10.4	11.3	12.8	16.2	38.5	72.0	90.5
Milling	11.1	6.8	12.1	14.4	18.2	23.2	20.6	26.7	44.2	55.8
NC Milling	—	—	—	—	0.9	2.1	3.1	7.1	9.8	11.3
Drilling	4.9	2.7	3.8	2.8	5.1	6.3	6.7	8.8	13.5	19.1
Boring	1.6	1.3	2.4	3.1	1.9	2.6	3.1	3.4	6.1	10.0
Grinding	1.2	2.3	4.3	4.4	4.7	8.6	8.5	14.9	25.4	34.7
Electrical Discharge	—	—	—	1.3	1.0	4.8	2.7	6.1	14.6	8.4
Sawing	0.6	2.9	0.7	0.7	1.1	1.7	2.2	4.0	8.7	11.4
Gear Cutting	1.0	0.7	0.3	0.3	1.6	0.1	1.2	1.4	8.6	6.3
Tapping	—	0.2	0.2	0.1	0.5	1.0	0.7	1.0	2.3	3.3
Shaping	0.2	0.4	0.2	—	0.3	1.0	0.2	1.4	0.8	0.3
Planing	1.1	1.3	0.8	0.6	0.4	0.6	0.7	1.0	1.6	3.0
Special Purpose	—	—	—	1.7	4.5	3.3	7.6	19.3	66.1	56.9
Machining Centers	—	—	0.7	5.3	10.1	12.4	19.5	24.8	50.8	62.8
Other Metal Cutting	0.1	0.1	0.5	0.7	4.4	1.4	11.4	10.2	4.4	14.8
Metal Forming Total	55.1	32.7	34.0	46.8	64.3	91.6	34.2	119.5	137.4	149.4
Presses	46.7	17.5	19.0	31.7	39.1	58.0	24.7	103.3	119.2	125.1
Rolling Machines	3.7	5.6	1.2	4.2	8.3	3.5	4.1	7.4	8.2	9.0
Shearing	—	—	—	0.3	1.1	1.4	1.4	2.8	1.6	0.6
Wire Drawing	—	—	—	1.6	2.2	5.2	2.9	4.5	0.2	13.3
Bending	—	—	—	—	0.3	0.9	0.2	0.2	6.5	0.2
Other Metal Forming	4.8	9.7	13.8	9.1	13.2	22.5	0.8	1.4	1.8	1.2

Note: Individual items may not add to totals due to rounding.

Source: Korea Machine Tool Manufacturers' Association.

KOREAN EXPORTS OF MACHINE TOOLS
By Type of Machine, 1986 to 1988
(Thousands of Dollars)

Type of Machine	1986		1987		1988	
	Unit	Value	Unit	Value	Unit	Value
Total Machine Tools	5,596	$27,727	33,385	$37,469	NA	NA
Metal Cutting Machine Tools	4,419	25,878	25,128	32,700	28,145	50,200
Lathes	1,370	8,592	8,980	6,228	916	6,812
NC Lathes	260	12,090	335	17,704	664	26,254
Milling	106	1,033	92	1,051	436	2,172
NC Milling	0	0	1	15	3	40
Drilling	95	156	141	166	827	464
NC Drilling	0	0	2	61	5	206
Boring	7	136	45	113	693	358
NC Boring	1	58	0	0	0	0
Grinding	351	529	137	657	NA	NA
Gear Cutting	25	537	86	319	11	114
Electrical Discharge	2	27	130	112	151	742
Machining Centers	35	1,820	84	4,794	174	7,717
Other Metal Cutting	2,167	900	15,095	1,480	24,235	5,327
Metal Forming Machine Tools	1,177	1,849	8,257	4,769	NA	NA

Note: Individal items may not add to totals due to rounding.

Source: Korea Machine Tool Manufacturers' Association.

KOREAN IMPORTS OF MACHINE TOOLS
By Type of Machine, 1986 to 1988
(Thousands of Dollars)

Type of Machine	1986		1987		1988	
	Unit	Value	Unit	Value	Unit	Value
Total Machine Tools	5,451	$357,961	12,910	$486,110	190,536	$595,370
Metal Cutting Machine Tools	4,578	238,650	11,183	340,656	105,268	450,369
Lathes	392	15,651	1,469	29,198	10,819	35,904
NC Lathes	168	18,044	192	18,358	163	24,674
Milling	348	12,542	1,442	27,544	5,794	17,325
NC Milling	52	9,691	128	14,649	91	14,140
Drilling	606	10,259	1,095	19,363	1,314	9,928
NC Drilling	24	4,617	40	4,544	30	3,338
Boring	168	17,572	87	13,997	1,100	19,113
NC Boring	18	6,909	42	10,154	62	14,529
Gear Cutting	350	6,568	134	12,222	149	13,988
NC Gear Cutting	70	10,994	272	21,489	131	25,589
Grinding	696	60,535	2,791	80,403	1,869	134,688
Electrical Discharge	134	9,830	276	18,634	351	27,695
Machining Centers	28	8,480	50	11,191	NA	NA
Other Metal Cutting	1,524	46,958	3,165	58,910	53,395	109,458
Metal Forming Machine Tools	873	119,311	1,727	145,454	85,268	145,001

Note: Individual items may not add to totals due to rounding.

Source: Korea Machine Tool Manufacturers' Association.

U.S.S.R. INDUSTRIAL PRODUCTION
For Selected Products and Industries, 1983 to 1985

	Unit of Measure	1983	1984(r)	1985
MACHINE TOOL INDUSTRY				
Metal Cutting Machines	Thousands	190	188	182
Metal Cutting Machines(a)	Mill. Rubles	2,200	2,390	2,674
Metal Cutting Machines, NC	Units	11,400	13,300	17,600
Presses—Forging Machines	Thousands	57	55	53
Presses—Forging Machines(a)	Mill. Rubles	657	664	662
OTHER SELECTED PRODUCTS AND INDUSTRIES				
Electric Power	Bill. Kwh	1,418	1,492	1,545
Petroleum	Mill. Tons	616	613	595
Gas	Bill. Cu. Meters	536	587	643
Coal Incl. Coking Coal	Mill. Tons	716	712	726
Cast Iron	Mill. Tons	110	111	110
Steel	Mill. Tons	153	154	155
Rolled Ferrous Metal	Mill. Tons	122	123	128
Steel Pipe	Mill. Meters	2,711	2,738	2,747
Steel Pipe	Mill. Tons	19	19	19
Iron Ore	Mill. Tons	245	247	248
Instruments & Automation Equip. with Spare Parts(a)	Mill. Rubles	4,300	4,600	4,800
Computing Equip. with Spare Parts(a)	Mill. Rubles	3,300	3,700	4,200
Automobiles	Thousands	1,315	1,327	1,332

r - Revised.

(a) Data in wholesale prices.

Source: The U.S.S.R. in Figures for 1984 - U.S.S.R. Central Statistical Administration.

As the exchange rate of the ruble is controlled, value figures are given in rubles.

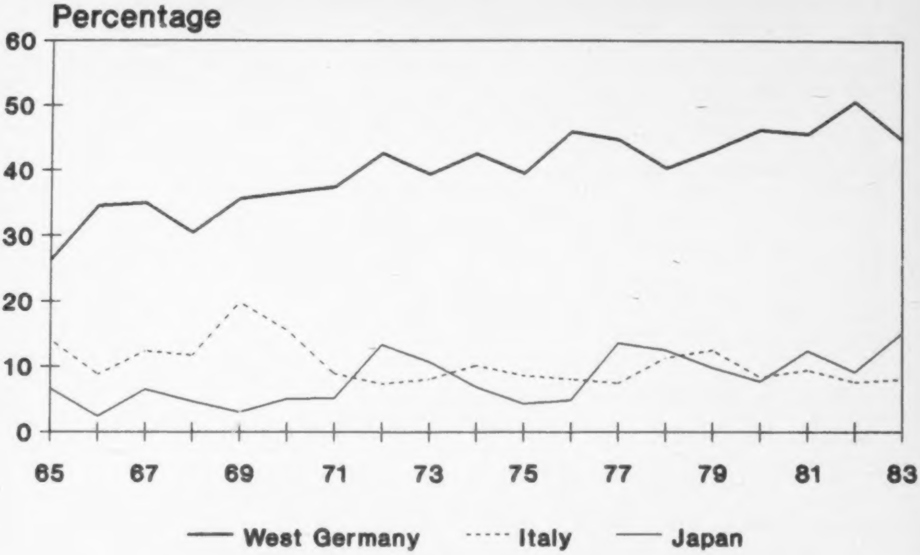
The official exchange rate: 1983 $1 = .743 rubles; 1984 $1 = .816 rubles; 1985 $1 = .838 rubles.

U.S.S.R. PRODUCTION OF MACHINE TOOLS
Units For Selected Years, 1940 to 1985

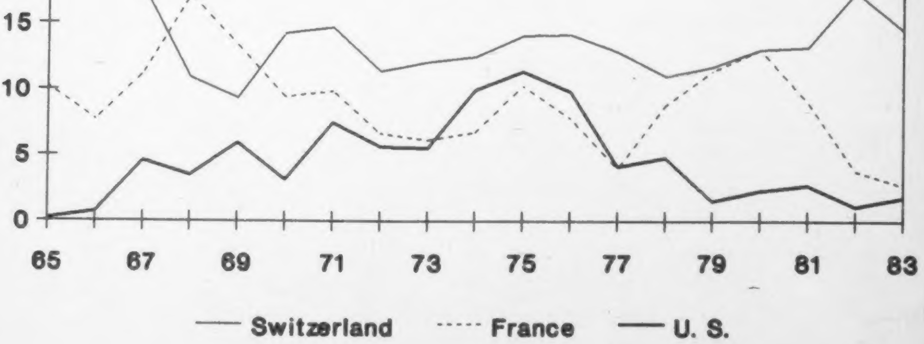
Year	Metal Cutting MachineTools	Forging Machines & Presses	Year	Metal Cutting MachineTools	Forging Machines & Presses
1940	58,400	4,668	1971	207,000	42,300
1945	38,400	2,871	1972	211,000	44,000
1950	70,600	7,684	1973	214,000	46,500
1955	117,100	17,117	1974	224,000	48,900
1960	155,900	29,933	1975	231,000	50,500
1961	165,000	30,520	1976	232,000	51,900
1962	176,800	33,434	1977	236,000	54,300
1963	182,700	34,221	1978	236,000	55,400
1964	184,400	34,497	1979	231,000	55,200
1965	186,100	34,637	1980	216,000	57,200
1966	192,200	38,412	1981	205,000	57,100
1967	197,000	41,126	1982	195,000	57,300
1968	200,600	42,128	1983	190,000	57,400
1969	205,300	42,658	1984	188,000	55,300
1970	202,300	41,268	1985	182,000	52,700

Source: The U.S.S.R. in Figures for 1985—U.S.S.R. Central Statistical Administration.

East Bloc Machine Tool Imports
From West Germany, Italy and Japan



East Bloc Machine Tool Imports
From Switzerland, France and the U. S.



EASTERN BLOC (a) MACHINE TOOL IMPORTS
FROM 14 MAJOR NON-COMMUNIST TRADING NATIONS (b)
Total and Selected Nations, 1965 to 1983

(Values in Millions of U.S. Dollars)

		United States		France		West Germany		Italy		Japan		Switzerland	
Year	Total	Value	%(c)	Value	%(c)	Value	%(c)	Value	%(c)	Value	%(c)	Value	%(c)
1965	$ 60.9	$ .1	.2%	$ 6.2	10.2%	$ 16.0	26.3%	$ 8.5	14.0%	$ 4.0	6.6%	$ 14.1	23.2%
1966	71.3	.5	.7	5.5	7.7	24.6	34.5	6.3	8.8	1.7	2.4	17.7	24.8
1967	93.6	4.3	4.6	10.5	11.2	32.8	35.0	11.6	12.4	6.1	6.5	16.5	17.6
1968	162.7	5.7	3.5	27.9	17.1	49.6	30.5	19.1	11.7	7.6	4.7	17.8	10.9
1969	307.3	18.1	5.9	40.9	13.3	109.3	35.6	[illegible]	19.9	9.3	3.0	28.7	9.3
1970	257.9	8.0	3.1	24.2	9.4	94.2	36.5	40.3	15.6	12.8	5.0	36.5	14.2
1971	201.2	14.8	7.4	19.8	9.8	75.5	37.5	18.0	8.9	10.2	5.1	29.3	14.6
1972	385.5	21.5	5.6	25.4	6.6	164.3	42.6	28.3	7.3	51.2	13.3	43.6	11.3
1973	597.8	32.6	5.5	36.5	6.1	235.7	39.4	48.6	8.1	63.9	10.7	71.5	12.0
1974	727.4	72.2	9.9	48.6	6.7	309.2	42.5	74.2	10.2	50.4	6.9	89.9	12.4
1975	899.6	102.1	11.3	82.1	10.2	355.2	39.5	77.6	8.6	38.7	4.3	125.9	14.0
1976	976.8	63.8	9.8	76.6	7.8	447.9	45.9	79.6	8.1	48.3	4.9	138.0	14.1
1977	1,127.8	46.6(d)	4.1	45.6	4.0	504.6	44.7	83.7	7.4	153.7	13.6	144.9	12.8
1978	1,331.3	63.3(e)	4.8	116.7	8.8	536.8	40.3	150.0	11.3	165.9(f)	12.5	145.9	11.0
1979	1,243.8	18.5(d)	1.5	141.9	11.4	534.9	43.0	155.6	12.5	111.8	9.8	145.9	11.7
1980	998.4	23.4(e)	2.3	130.0	13.0	461.5	46.2	83.3	8.3	77.0	7.7	129.9	13.0
1981	719.9	19.6(e)	2.7	64.7	9.0	328.2	45.6	68.0	9.4	89.5	12.4	94.9	13.2
1982	667.9	7.1	1.1	25.2(i)	3.8	338.0	50.6	50.7	7.6	61.2(h)	9.2	116.0	17.4
1983	787.1	14.0(g)	1.8	21.0	2.7	352.7	44.8	63.7	8.1	118.7(i)	15.1	114.0	14.5

(a) Bulgaria, Czechoslovakia, E. Germany, Hungary, Poland, Rumania, and U.S.S.R.
(b) United States, Austria, Belgium-Luxembourg, Canada, Denmark, France, Federal Republic of Germany, Italy, Japan, Netherlands, Norway, Sweden, Switzerland, and United Kingdom.
(c) Percent of total Eastern Bloc machine tool imports from non-communist countries.
(d) Does not include Bulgarian imports.
(e) Does not include East German imports.
(f) Does not include Czechoslovakian imports.
(g) Does not include Hungarian imports.
(h) Does not include Polish imports.
(i) Does not include Romanian imports.

Source: U.S. Dept. of Commerce, "Market Share Reports," Commodity Series, Machine Tools For Working Metals; and NMTBA.

METAL CUTTING (a) MACHINE TOOL PRODUCTION (c)

U.S. and Selected Communist Countries

For selected years, 1960 to 1985

	1960	1970	1975	1980	1982	1983(r)	1984(r)	1985(r)	1986
United States (b)									
Million US $	$539.30	$1,097.70	$1,790.40	NA	NA	NA	NA	NA	NA
Thousand units	42.91	49.31	64.32	61.37	49.10	35.40	34.45	33.82	35.01
Communist Countries									
USSR and Eastern Europe									
USSR									
Million US $	$611.74	$1,427.88	$2,179.78	NA	NA	NA	NA	NA	NA
Thousand units	155.92	202.16	231.35	216.00	195.00	190.00	188.00	182.00	163.00
Bulgaria (thousand units)	3.15	13.94	16.28	18.87	17.90	15.12	15.20	17.20	19.46
Czechoslovakia(thousand units)	30.23	35.19	29.66	36.90	37.10	35.40	37.00	37.20	37.60
East Germany (thousand units)	41.90	22.22	19.72	17.50	18.00	20.40	20.70	21.90	23.21
Hungary (thousand units)	9.78	14.48	12.83	10.20	13.10	13.10	13.10	10.70	10.70
Poland (thousand units)	22.47	29.73	33.19	28.20	32.20	39.30	47.10	48.70	50.35
Romania (thousand units)	4.44	14.14	28.27	29.40	37.90	59.00	80.20	89.40	90.80
China (thousand units)(r)	153.50	138.90	174.90	133.60	99.80	121.00	133.50	167.20	159.00

NA - Not Available. r - Revised.

(a) Power-driven metal cutting machines that are not portable by hand and are used to remove metal in the form of chips; these machines include lathes and planers and milling, honing, lapping, grinding, electroerosion, and ultrasonic cutting machines.

(b) Average value of $1,000 and over for 1960-75 and beginning in 1980, $2,500 and over.

(c) The data above are only available through the C.I.A. whose sources are confidential.

Source: C.I.A. "Handbook of Economic Statistics, 1987."

METAL FORMING MACHINE TOOL (a) PRODUCTION (c)

U.S. and U.S.S.R.

For selected years, 1960 to 1986

	1960	1970	1975	1980	1982	1983	1984	1985	1986
United States									
Million US$	$238.4	$454.1	$615.7	NA	NA	NA	NA	NA	NA
Thousand units(b)	19.3	24.2	26.8	30.3	18.3	31.5	34.1	17.8	38.3
USSR									
Million US$	$188.3	$359.2	$581.1	NA	NA	NA	NA	NA	NA
Thousand units	29.9	41.3	50.5	57.2	57.3	57.4	55.3	52.7	51.4

NA - Not Available.

(a) Power-driven metal forming machine tools that are not supported in the hands of an operator when in use and are designed to press, forge, emboss, hammer, extrude, blank, spin, shear, and bend metal into shape.

(b) Average value of $1,000 and over for 1960-75 and beginning in 1980, $2,500 and over.

(c) The data above are only available through the C.I.A. whose sources are confidential.

Source: C.I.A. "Handbook of Economic Statistics, 1987."

COMMUNIST COUNTRIES' EXPORTS OF MACHINERY (a)

1973 to 1977

(Millions of U.S. Dollars)

		Exported to					
Exporting Country	Total(b)	Communist Countries (c)	Free Europe (Incl. Yugosl.)	U.S., Canada, Japan	Africa (Excl. S. Afr.)	Asia (d)	Latin America (e)
TOTAL							
1973	$ 9,143	$ 6,917	$638	$48	$298	$ 867	$284
1974	10,606	8,228	759	71	319	986	88
1975	12,401	9,323	929	80	341	1,067	117
1976	14,050	11,130	580	40	218	587	97
1977	15,605	12,726	665	45	250	785	110
U.S.S.R.							
1973	2,718	1,541	245	3	170	491	182
1974	3,357	2,249	232	10	154	555	11
1975	3,553	2,051	252	17	136	540	22
1976	3,953	2,952	127	3	96	303	23
1977	4,759	3,538	153	3	115	28	
East Germany							
1973	2,254	1,959	123	11	45	78	37
1974	2,507	2,181	152	12	42	92	26
1975	2,972	2,615	169	9	36	114	24
1976	3,458	2,957	135	4	50	104	25
1977	3,833	3,328	150	5	54	104	27
Czechoslovakia							
1973	1,774	1,404	128	16	54	134	35
1974	1,973	1,511	169	22	81	153	32
1975	2,303	1,776	195	20	106	162	41
1976	2,700	2,032	130	8	38	113	28
1977	2,972	2,237	143	9	41	124	32
Poland							
1973	578	438	68	9	10	48	5
1974	641	454	96	17	9	54	10
1975	836	576	145	19	14	63	19
1976	1,124	855	91	12	12	54	13
1977	1,335	1,015	109	14	14	64	15
Hungary							
1973	587	514	22	1	3	41	6
1974	689	597	35	1	3	49	5
1975	910	749	74	1	5	77	4
1976	895	752	33	1	3	31	5
1977	1,055	886	38	1	3	37	6
Romania							
1973	388	269	34	7	11	59	8
1974	437	293	49	8	22	61	3
1975	561	372	58	13	30	83	4
1976	440	215	37	13	15	58	2
1977	495	242	42	14	16	65	2
Bulgaria							
1973	844	792	18	1	5	16	11
1974	1,002	943	26	1	8	22	1
1975	1,266	1,185	36	1	13	30	1
1976	1,481	1,358	27	1	6	23	1
1977	1,615	1,480	30	1	6	26	1

(a) Note that these figures are for machinery in general and not for machine tools only.

(b) Total includes Australia, New Zealand, South Africa and not specified.

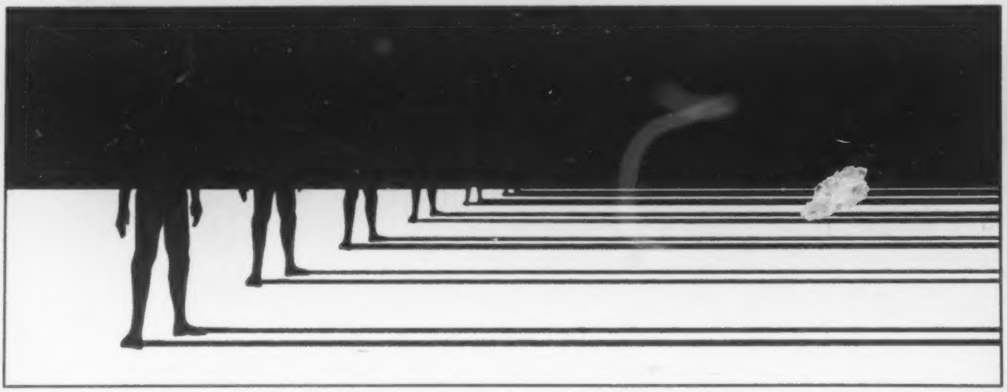
(c) U.S.S.R., East Germany, Czechoslovakia, Poland, Hungary, Romania, Bulgaria, Albania; beginning with 1974 includes Cuba and Outer Mongolia.

(d) Excluding Japan; beginning with 1974 excludes Outer Mongolia.

(e) Beginning with 1974 excludes Cuba.

Source: Verein Deutscher Maschinenbau – Anstalten, VDMA, "Statistisches Handbuch fur den Maschinenbau" (annually).

The future of industry depends on new employees



Put NMTBA's new career recruitment film to work for you. "Machine Tool Careers" is available *free of charge* for use in your company's personnel development efforts, as well as in local high schools and vocational schools. The informative 25-minute film is also available in video cassette.

This colorful film shows young, successful metalworking industry employees—operators, programmers, assembly technicians, service engineers and supervisors—describing their work, their career progress and their life styles. In addition, the motion picture covers what machine tools are and their importance to our nation's industrial achievements.

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"Machine Tool Careers"—*an investment in the future.*

7

EMPLOYMENT AND EARNINGS

Relative to total U.S. Industry, the machine tool industry is small. If all the employees of the industry were to work for a single company, it would rank only about 60th among U.S. industrial corporations. These employment statistics demonstrate that the industry is characterized by a substantial number of small and medium-sized establishments.

Historically, industry employment has fluctuated sharply with changes in new orders and shipments. Evidence of this is provided not only by the employment statistics but also by the labor turnover data in this chapter. These fluctuations create serious problems for the industry. When employment has to be cut due to business slowdown, some of the highly skilled labor force is lost. Conversely, when business recovers, there is typically a shortage of skilled workers. Extensive overtime is characteristic of the industry when orders are high.

To fill the gap in skilled workers, the industry sponsors training programs and NMTBA's Training Director assists Association members in solving a variety of labor supply problems. The advent of computers and electronics as major components of machine tools has led to a steady shift in both the nature and composition of the industry's workforce. While skilled machinists are still a mainstay of machine tool building operations, electronic engineers and computer professionals are becoming increasingly important.

Wages in the industry are competitive with those in comparable industries. Average hourly earnings for production workers in the metal cutting machine tool segment were $11.28 in 1988. Average earnings in the metal forming sector of the industry were $11.77. The average weekly hours worked in the industry were 43.0 for the metal cutting tool builders' employees, and 44.8 for the metal forming machine tool builders' employees.

Work injury rates in metal cutting machine tool establishments are substantially lower, in lost workday cases, than the average for all manufacturing industries. The NMTBA Safety Director works closely with government agencies, industry members, and major industry customers to solve problems affecting safety and health.

Total compensation in the metal and metalworking industries in the U.S. has grown more rapidly than in other countries as a result of the dollar's strengthening during the first half of the 80's. However, U.S. wage growth has slowed significantly, relative to other industrialized nations, as a result of the dollar's decline over the past two years.

Most of the data in this chapter comes from the U.S. Department of Labor's Bureau of Labor Statistics, primarily from their monthly "Employment and Earnings" tabulation. Some of the data is obtained from the Bureau of the Census, primarily its annual "Survey of Manufacturers" series. The Census data may be more complete because it is based on the enumeration of all workers in SIC identified industries that is obtained in the "Census of Manufacturers." However, as the Census comes out only every five years and the "Survey of Manufacturers" is annual, the data from the BLS offers much more timely information with only a marginal loss of accuracy. For further explanation of the terms used in this chapter, see the Glossary at the end of this book.

EMPLOYMENT IN THE MACHINE TOOL INDUSTRY
1959 to Date
(Average Annual Employment in Thousands)

	All Employees		Production Workers		Female Employees	
Year	Metal Cutting	Metal Forming	Metal Cutting	Metal Forming	Metal Cutting	Metal Forming
1959	64.8	NA	44.3	NA	6.0	NA
1960	69.5	NA	48.2	NA	6.5	NA
1961	63.3	NA	42.8	NA	5.9	NA
1962	63.7	NA	43.7	NA	5.8	NA
1963	63.6	NA	44.0	NA	5.7	NA
1964	67.1	NA	46.7	NA	5.8	NA
1965	72.8	NA	50.8	NA	6.2	NA
1966	79.4	NA	55.7	NA	7.1	NA
1967	83.3	NA	57.9	NA	7.9	NA
1968	80.0	NA	54.5	NA	7.6	NA
1969	77.4	NA	52.2	NA	7.4	NA
1970	69.2	NA	45.5	NA	6.8	NA
1971	54.9	NA	34.9	NA	5.4	NA
1972	55.8	NA	35.8	NA	5.5	NA
1973	63.7	NA	42.6	NA	6.4	NA
1974	67.8	NA	45.6	NA	7.1	NA
1975	63.3	NA	41.8	NA	6.5	NA
1976	59.9	NA	38.8	NA	6.4	NA
1977	65.2	23.3	41.9	15.4	7.3	NA
1978	70.9	25.0	45.9	16.5	8.4	NA
1979	77.4	26.9	51.2	17.7	9.7	NA
1980	81.6	26.4	54.7	17.0	10.6	NA
1981	80.0	24.4	52.0	15.3	10.7	NA
1982	64.9	21.0	39.3	12.6	8.8	2.2(u)
1983	52.0	17.1	29.9	9.9	7.3	1.7(u)
1984	55.3	18.6	33.7	11.4	8.0	1.9(u)
1985	53.8	19.2	33.9	11.8	8.1	2.1(u)
1986	49.9	19.5	31.4	11.9	7.6	2.2(u)
1987(r)	45.6	19.0	28.7	11.9	7.3	2.0(u)
1987(p)	46.4	17.5	29.9	11.4	7.9	2.1(u)

r - Revised. p - Preliminary. NA - Not Available. u - Unofficial BLS Estimate.

Note: The figures published by the Bureau of Labor Statistics are based on monthly sample surveys and differ from the figures shown by the Census.

Sources: U.S. Bureau of Labor Statistics, "Employment and Earnings Statistics, 1909-84," monthly issues and annual supplements.

EMPLOYMENT AND AVERAGE WEEKLY HOURS OF PRODUCTION WORKERS

Machine Tool Industry

Monthly, 1986 to Date

Month	Number of Production Workers (Employment in Thousands)			Average Weekly Hours		
	1986	1987	1988	1986	1987	1988
Metal Cutting						
Jan.	32.8	29.9	28.7	43.0	42.1	42.5
Feb.	32.6	29.2	28.8	42.6	42.3	42.3
Mar.	32.4	29.1	28.7	42.7	42.3	42.9
Apr.	32.0	28.7	28.9	42.8	41.3	42.5
May	31.7	28.3	30.8	42.9	41.7	42.4
June	31.7	28.4	31.0	42.6	42.5	42.8
July	31.1	28.1	30.9	41.4	41.3	42.2
Aug.	30.9	28.1	29.3	41.7	41.7	42.6
Sept.	30.6	28.5	29.9	41.7	41.1	43.5
Oct.	30.3	28.5	30.3	41.7	42.3	43.3
Nov.	30.2	28.6	30.9	41.9	42.7	43.9
Dec.	30.1	28.8	31.1	43.3	43.8	44.8
Yearly Avg.	31.4	28.7	29.9	42.4	42.1	43.0
Metal Forming						
Jan.	11.9	11.9	11.3	42.4	41.2	44.6
Feb.	11.9	11.9	11.0	42.5	41.8	45.0
Mar	11.9	11.9	11.1	42.5	41.2	44.6
Apr.	11.8	11.9	11.1	42.4	40.4	44.5
May	11.9	11.9	11.7	41.6	41.7	43.8
June	12.1	11.9	11.8	42.0	42.1	44.1
July	11.7	11.6	11.8	41.4	41.4	44.9
Aug.	11.7	11.5	11.2	40.2	42.9	43.7
Sept.	11.9	12.1	11.4	41.5	43.2	45.3
Oct.	12.0	12.0	11.5	41.9	43.3	45.1
Nov.	11.8	12.2	11.6	42.5	44.6	45.9
Dec.	11.8	12.3	11.0	42.6	45.1	46.5
Yearly Avg.	11.9	11.9	11.4	42.0	42.4	44.8
Total Machine Tools						
Yearly Avg.	43.2	40.6	41.3	42.2	42.3	43.5

Sources: U.S. Bureau of Labor Statistics, "Employment and Earnings Statistics, 1909-84," monthly issues and annual supplements.

HOURS AND GROSS EARNINGS OF PRODUCTION WORKERS
Metalworking and Metal Cutting Industries, 1949 to Date

	Metalworking Machinery Industry			Metal Cutting Machine Tool Industry		
Year	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings	Average Weekly Earnings	Average Weekly Hours	Average Hourly Earnings
1949	$ 61.33	39.8	$ 1.54	$ 59.23	39.2	$ 1.51
1950	71.73	43.5	1.65	69.87	43.1	1.62
1951	86.01	47.4	1.83	85.14	47.3	1.80
1952	92.20	46.8	1.97	90.24	47.0	1.92
1953	96.81	46.1	2.10	95.17	46.2	2.06
1954	93.09	42.9	2.17	89.25	42.5	2.10
1955	98.34	43.9	2.24	95.48	43.6	2.19
1956	108.96	45.4	2.40	106.25	45.6	2.33
1957	106.89	43.1	2.48	101.04	42.1	2.40
1958	102.00	40.0	2.55	91.20	38.0	2.40
1959	113.74	42.6	2.67	106.93	42.1	2.54
1960	117.27	42.8	2.74	110.99	42.2	2.63
1961	117.04	41.8	2.80	111.92	41.3	2.71
1962	125.57	43.3	2.90	119.41	42.8	2.79
1963	128.90	43.4	2.97	124.42	43.2	2.88
1964	137.06	44.5	3.08	132.01	44.3	2.98
1965	144.37	45.4	3.18	138.76	45.2	3.07
1966	153.72	46.3	3.32	150.20	46.5	3.23
1967	154.56	44.8	3.45	154.25	45.5	3.39
1968	158.70	43.6	3.64	152.65	43.0	3.55
1969	172.38	44.2	3.90	166.61	43.5	3.83
1970	174.28	42.3	4.12	166.00	41.5	4.00
1971	174.62	40.8	4.28	163.90	39.4	4.16
1972	198.29	43.2	4.59	194.71	42.7	4.56
1973	214.90	44.4	4.84	219.11	44.9	4.88
1974	225.33	43.5	5.18	232.74	44.5	5.23
1975	226.46	41.1	5.51	232.68	42.0	5.54
1976	248.89	41.9	5.94	249.96	41.8	5.98
1977	279.72	43.1	6.49	290.18	43.9	6.61
1978	308.88	44.0	7.02	322.56	44.8	7.20
1979	329.30	43.5	7.57	344.21	44.3	7.77
1980	346.83	42.4	8.18	366.21	43.7	8.38
1981	371.90	41.6	8.94	383.95	42.1	9.12
1982	380.09	39.8	9.55	380.44	38.9	9.78
1983	399.67	40.7	9.82	386.49	39.0	9.91
1984	436.29	42.9	10.17	432.48	42.4	10.20
1985	450.08	42.5	10.59	450.71	42.6	10.58
1986	465.55	42.4	10.98	465.13	42.4	10.96
1987	473.68	42.5	11.14	467.76	42.1	11.08
1988	494.76	43.4	11.40	486.76	43.0	11.32

Note: Earnings figures include overtime and premium pay.

Sources: U.S. Bureau of Labor Statistics, "Employment and Earnings Statistics, 1909-84," monthly issues and annual supplements.

AVERAGE WEEKLY EARNINGS OF PRODUCTION WORKERS

Selected Industry Groups, 1949 to Date, Annual Averages

Year	Durable Goods Industries	Nonelectrical Machinery Industry	Motor Vehicles & Equipment Industry	Aircraft and Parts Industry	Metal Working Machinery Industry	Metal Cutting Machinery Industry
1949	$ 57.25	$ 60.31	$ 67.33	$ 63.34	$ 61.33	$ 59.23
1950	62.43	67.08	74.85	68.10	71.73	69.87
1951	68.48	76.13	77.16	77.96	86.01	85.14
1952	72.63	79.55	84.87	81.27	92.20	90.24
1953	76.63	82.68	89.88	83.38	96.81	95.17
1954	76.19	81.40	91.30	84.66	93.09	89.25
1955	82.19	87.36	99.84	89.21	98.34	95.48
1956	85.28	93.06	96.82	95.57	108.96	106.25
1957	88.26	94.12	100.61	96.35	106.89	101.04
1958	89.27	94.33	101.24	101.25	102.00	91.20
1959	96.05	102.92	111.38	106.63	113.74	106.93
1960	97.44	104.55	115.21	110.43	117.27	110.99
1961	100.35	107.42	114.65	114.68	117.04	111.92
1962	104.70	113.01	127.67	119.97	125.57	119.41
1963	108.09	116.20	132.68	122.43	128.90	124.42
1964	112.19	121.69	138.03	125.03	137.06	132.01
1965	117.18	127.58	147.63	131.88	144.37	138.76
1966	122.09	135.34	147.23	143.32	153.72	150.20
1967	123.60	135.89	144.84	146.97	154.56	154.25
1968	132.07	141.88	167.66	152.04	158.70	152.65
1969	139.59	152.15	170.56	161.35	172.36	166.61
1970	143.47	154.95	170.47	168.92	174.28	166.00
1971	153.52	161.99	195.29	175.82	174.62	163.90
1972	167.27	179.34	219.22	193.44	198.29	194.71
1973	179.28	193.83	237.08	207.50	214.90	219.11
1974	190.48	207.62	239.54	218.70	225.33	232.74
1975	205.09	219.22	262.68	246.19	226.46	232.68
1976	225.33	236.74	305.30	263.16	248.89	249.96
1977	248.46	259.79	345.40	289.95	279.72	290.18
1978	270.44	285.44	368.05	318.19	308.88	322.56
1979	290.90	305.98	372.37	351.05	329.30	344.21
1980	310.78	328.00	394.00	389.76	346.83	366.21
1981	343.31	360.33	450.72	425.80	371.90	383.95
1982	355.27	367.62	470.61	461.55	380.09	380.44
1983	382.17	386.78	525.66	486.98	399.67	386.49
1984	403.24	417.32	557.57	516.21	436.29	432.48
1985	416.12	427.04	582.47	533.83	450.08	450.71
1986	424.98	440.54	572.97	550.84	465.55	465.13
1987	434.32	454.32	574.04	560.40	473.68	467.76
1988	447.26	467.32	612.05	576.64	494.76	486.76

Sources: U.S. Bureau of Labor Statistics, "Employment and Earnings Statistics, 1909-84," monthly issues and annual summaries.

AVERAGE HOURLY EARNINGS OF PRODUCTION WORKERS

Selected Industry Groups, 1949 to Date, Annual Averages

Year	Durable Goods Industries	Nonelectrical Machinery Industry	Motor Vehicles & Equipment Industry	Aircraft and Parts Industry	Metal Working Machinery Industry	Metal Cutting Machinery Industry
1949	$ 1.45	$ 1.52	$ 1.70	$ 1.56	$ 1.54	$ 1.51
1950	1.52	1.60	1.78	1.64	1.65	1.62
1951	1.65	1.75	1.91	1.78	1.83	1.80
1952	1.75	1.85	2.05	1.89	1.97	1.92
1953	1.86	1.95	2.14	1.99	2.10	2.06
1954	1.90	2.00	2.20	2.07	2.17	2.10
1955	1.99	2.08	2.29	2.16	2.24	2.19
1956	2.08	2.20	2.35	2.27	2.40	2.33
1957	2.19	2.29	2.46	2.35	2.48	2.40
1958	2.26	2.37	2.55	2.50	2.55	2.40
1959	2.36	2.48	2.71	2.62	2.67	2.54
1960	2.43	2.55	2.81	2.70	2.74	2.63
1961	2.49	2.62	2.86	2.77	2.80	2.71
1962	2.56	2.71	2.99	2.87	2.90	2.79
1963	2.63	2.78	3.10	2.95	2.97	2.88
1964	2.71	2.87	3.21	3.02	3.06	2.98
1965	2.79	2.96	3.34	3.14	3.18	3.07
1966	2.90	3.09	3.44	3.31	3.32	3.23
1967	3.00	3.19	3.55	3.45	3.45	3.39
1968	3.19	3.37	3.89	3.62	3.64	3.55
1969	3.38	3.58	4.10	3.86	3.90	3.83
1970	3.56	3.77	4.23	4.12	4.12	4.00
1971	3.80	3.99	4.74	4.32	4.28	4.16
1972	4.05	4.27	5.11	4.65	4.59	4.56
1973	4.32	4.55	5.45	5.00	4.84	4.88
1974	4.68	4.92	5.90	5.40	5.18	5.23
1975	5.14	5.36	6.47	5.99	5.51	5.54
1976	5.55	5.76	7.10	6.45	5.94	5.98
1977	6.06	6.26	7.85	6.92	6.49	6.61
1978	6.58	6.78	8.50	7.54	7.02	7.20
1979	7.13	7.32	9.06	8.26	7.57	7.77
1980	7.75	8.00	9.85	9.28	8.18	8.38
1981	8.54	8.81	11.02	10.31	8.94	9.12
1982	9.04	9.26	11.62	11.23	9.55	9.78
1983	9.39	9.55	12.14	11.82	9.82	9.91
1984	9.74	9.96	12.73	12.32	10.17	10.20
1985	10.10	10.29	13.39	12.62	10.59	10.58
1986	10.29	10.59	13.45	12.87	10.98	10.96
1987	10.45	10.77	13.57	13.19	11.14	11.08
1988	10.70	10.97	14.07	13.60	11.40	11.32

Sources: U.S. Bureau of Labor Statistics, "Employment and Earnings Statistics, 1909-84," monthly issues and annual supplements.

AVERAGE HOURLY EARNINGS IN THE MACHINERY MANUFACTURING INDUSTRY (a)

In Selected Areas by Occupation, 1978, 1981, 1983

	Occupation				
	Machine Tool Operators, Production				
Region and Survey Year	Class A (b)	Class B (c)	Class C (d)	Numerically Controlled	Tool Room One Type Machine
1. Baltimore, Md.					
Jan. 1978	$ 6.74	$ 5.79	$ 5.24	$ 5.67	$ 6.54(e)
Jan. 1981	9.01	7.84	7.01	8.45	NA
Nov. 1983	10.65	9.61	7.83	10.25	NA
2. Boston, Mass.					
Jan. 1978	6.54	6.01	4.71	6.24	6.72
Jan. 1981	8.59	8.35	5.87	8.71	NA
Nov. 1983	10.99	10.16	NA	9.99	NA
3. Buffalo, N.Y.					
Jan. 1978	6.77	6.28	5.44	7.00	6.80
Jan. 1981	8.97	8.25	7.01	9.47	7.77
Nov. 1983	10.06	8.15	7.29	11.24	10.92
4. Chicago, Ill.					
Jan. 1978	7.38	6.51	5.90	7.55	8.36
Jan. 1981	9.60	8.00	6.63	9.68	11.12
Nov. 1983	11.50	9.28	8.39	11.03	12.63
5. Cleveland, Ohio					
Jan. 1978	7.02	6.01	4.12	7.17	7.09
Jan. 1981	9.43	8.13	6.78	9.41	9.66
Nov. 1983	10.15	8.92	7.10	10.40	10.67
6. Denver, Colo.					
Jan. 1978	6.60	5.36	5.04	6.44	6.63
Jan. 1981	9.30	7.23	NA	8.61	10.68
Nov. 1983	10.41	7.92	5.83	10.26	11.32
7. Detroit, Mich.					
Jan. 1978	8.19	7.01	5.48	7.14	8.94
Jan. 1981	11.61	9.48	6.21	9.98	11.98
Nov. 1983	12.70	10.92	9.58	11.61	12.39
8. Houston, Tx.					
Jan. 1978	7.15	6.66	4.89	7.29	7.26
Jan. 1981	9.92	8.96	5.93	10.25	10.47
Nov. 1983	11.56	9.71	9.68	11.86	11.55
9. L.A.-Long Beach, Cal.					
Jan. 1978	6.67	5.45	3.96	6.86	7.44
Jan. 1981	9.36	7.39	4.83	9.79	9.70
Nov. 1983	12.71	8.36	NA	14.72	12.46
10. Milwaukee, Wis.					
Jan. 1978	7.78	6.89	NA	7.43	7.86
Jan. 1981	10.47	9.91	8.45	10.36	10.63
Nov. 1983	11.71	11.37	10.22	12.06	11.89
11. Newark, N.J.					
Jan. 1978	6.50	6.59	4.85	6.29	7.47
Jan. 1981	9.44	9.04	6.35	7.68	9.25
Nov. 1983	9.83	9.38	5.31	10.54	10.45
12. Pittsburgh, Pa.					
Jan. 1978	7.15	6.71	6.15	6.69	7.21(e)
Jan. 1981	9.44	8.80	8.14	9.38	NA
Nov. 1983	10.53	8.89	7.48	11.46	10.13
13. St. Louis, Mo.-Ill.					
Jan. 1978	8.25	6.14	6.12	7.26	8.03
Jan. 1981	9.45	8.36	8.30	9.27	8.69
Nov. 1983	11.63	9.20	7.27	11.36	12.00

NA - Not Available.

(a) Nonelectrical Machinery (SIC 35).
(b) Operators who set up their own machines and perform a variety of machine operations to close tolerances using decisions based on blueprints and layouts.
(c) Operators who set up their own machines and maintain operation set-ups made by others.
(d) Operators who perform routine and repetitive operations but do not set up machines.
(e) More than one type of machine.

AVERAGE HOURLY EARNINGS IN THE MACHINERY MANUFACTURING INDUSTRY (a)

In Selected Areas by Occupation, 1978, 1981, 1983

(Continued)

	Occupation					
	Assemblers		Inspectors		Laborers, Material Handling	Tool Clerks
	Class A (f)	Class B (g)	Class A (h)	Class B (i)		
1.						
	$ 6.03	$ 5.71	$ 6.72	NA	$ 5.13	$ 5.38
	8.00	6.88	8.88	$ 7.72	7.21	NA
	11.00	7.10	11.45	8.04	5.96	NA
2.						
	6.18	4.89	NA	5.26	4.56	5.73
	8.31	6.62	8.47	7.44	6.18	7.22
	9.14	7.24	10.01	8.53	6.54	9.26
3.						
	6.92	6.43	7.20	6.36	NA	5.86
	9.24	8.07	9.35	7.62	8.11	7.80
	10.36	10.27	10.95	9.54	8.66	8.36
4.						
	6.84	6.49	7.43	6.80	5.86	6.47
	8.95	7.43	9.25	8.56	6.81	9.10
	11.01	8.93	11.54	10.11	8.35	10.15
5.						
	7.21	6.13	7.20	6.65	6.07	6.50
	9.64	7.80	9.93	8.46	8.90	8.86
	11.02	7.43	10.99	9.09	8.90	10.13
6.						
	5.94	4.30	6.67	5.93	4.75	5.89
	7.79	5.40	8.55	7.04	5.89	7.54
	9.53	7.05	9.82	NA	NA	NA
7.						
	7.80	7.23	7.79	6.50	6.94	7.13
	11.17	9.59	11.01	NA	9.45	9.80
	12.47	11.23	12.33	10.75	10.50	11.59
8.						
	6.89	5.86	7.37	6.43	5.38	6.36
	9.75	9.06	10.07	8.45	7.41	7.80
	10.89	10.77	11.57	11.22	9.15	9.20
9.						
	6.29	4.41	6.74	5.50	4.67	5.24
	8.02	6.09	9.77	7.24	5.74	6.93
	10.15	7.29	11.90	7.10	8.45	9.15
10.						
	7.72	6.96	7.24	6.97	6.19	6.28
	10.31	10.05	10.45	9.91	9.24	10.12
	11.45	10.76	11.82	10.92	10.51	10.95
11.						
	6.54	5.71	5.95	6.61	4.96	5.74
	7.93	5.90	7.83	7.77	7.21	7.82
	9.47	8.04	9.60	8.27	6.36	9.09
12.						
	7.14	6.02	7.37	6.66	5.33	6.18
	8.52	7.78	9.44	8.79	8.74	7.48
	9.74	7.63	11.22	10.50	9.66	10.08
13.						
	6.91	5.81	7.24	6.23	5.11	5.81
	9.10	7.57	9.04	8.35	6.79	7.86
	11.49	8.73	10.56	9.44	8.05	9.22

NA - Not Available.

(f) Fits and adjusts parts and makes decisions regarding proper performance of component or unit.

(g) Assembles parts in accordance with standard and prescribed procedures. Requires some fitting and adjusting.

(h) Responsible for decisions regarding quality of product and operations. Troubleshooting and interpreting of drawings and specifications is involved.

(i) Tests products and processes having rigid specifications with established inspection procedures.

Source: U.S. Department of Labor, Bureau of Labor Statistics.

EMPLOYMENT IN THE MACHINE TOOL INDUSTRY
1949 to 1987

Year	Machine Tool Total		Metal Cutting		Metal Forming	
	All Employees	Production Workers	All Employees	Production Workers	All Employees	Production Workers
1949	NA	NA	52,384	38,584	NA	NA
1950	NA	NA	54,747	41,555	NA	NA
1951	NA	NA	83,855	64,029	NA	NA
1952	NA	NA	102,735	79,471	NA	NA
1953	NA	NA	99,494	76,840	NA	NA
1954	NA	NA	80,959	62,106	NA	NA
1955	NA	NA	77,063	58,600	NA	NA
1956	NA	NA	85,469	65,208	NA	NA
1957	NA	NA	79,895	59,600	NA	NA
1958	75,366	51,726	52,864	36,154	22,502	15,572
1959	75,091	53,332	52,797	35,436	22,294	17,896
1960	81,200	57,439	58,777	39,487	22,423	17,952
1961	78,106	54,633	54,901	36,373	23,207	18,260
1962	82,251	57,662	58,855	39,253	23,396	18,409
1963	83,136	56,790	61,058	41,008	22,078	15,782
1964	88,079	61,196	65,078	44,471	23,001	16,725
1965	96,334	67,257	70,827	48,745	25,517	18,512
1966	108,174	76,190	79,767	55,279	28,407	20,911
1967	116,400	81,400	87,200	60,500	29,200	20,900
1968	112,200	76,900	84,300	57,500	27,900	19,400
1969	110,600	74,700	82,600	55,300	28,000	19,400
1970	100,200	65,900	71,300	45,800	28,900	20,100
1971	78,400	49,200	54,000	33,200	24,400	16,000
1972	76,600	50,000	52,500	33,400	24,100	16,600
1973	86,900	58,700	59,900	39,800	27,000	18,900
1974	94,000	64,200	65,000	43,900	29,000	20,300
1975	88,800	58,500	62,800	40,800	26,000	17,760
1976	81,000	53,500	58,100	37,600	22,900	15,900
1977	83,100	53,300	59,400	37,200	23,700	16,100
1978	89,500	59,200	64,300	42,200	25,200	17,000
1979	96,100	64,400	69,100	45,700	27,000	18,700
1980	99,700	66,000	72,800	47,800	26,900	18,200
1981	98,300	63,900	74,300	47,900	24,000	16,000
1982	77,800	46,000	58,300	33,900	19,500	12,100
1983	58,300	34,100	43,000	24,500	15,300	9,600
1984	58,500	35,200	42,400	24,700	16,100	10,500
1985	60,500	36,400	42,800	24,900	17,700	11,500
1986	55,200	32,700	38,600	22,000	16,600	10,700
1987	46,400	27,500	32,400	18,600	14,000	8,900

NA - Not Available.

Sources: U.S. Bureau of the Census, "Census of Manufacturers" and "Annual Survey of Manufacturers."

EMPLOYMENT AND COMPENSATION

Machine Tool Industry

Selected Years, 1960 to 1987

	All Employees		Production Workers		
Year	Number	Payroll (Million $)	Number	Man-hours (Million)	Wages (Million $)
1960	81,200	$ 523.0	57,439	116.7	$ 324.7
1962	82,251	573.8	57,662	118.2	344.5
1964	88,079	678.0	61,196	135.2	428.4
1966	108,174	918.3	76,190	171.2	591.7
1968	112,200	1,001.0	76,900	163.1	619.7
1970	100,200	965.3	65,900	136.6	572.6
1972	76,600	839.2	50,000	103.3	489.7
1973	86,900	1,033.0	58,700	125.1	623.0
1974	94,000	1,245.2	64,200	135.8	748.0
1975	88,800	1,193.4	58,500	117.5	695.2
1976	81,000	1,182.2	53,500	105.5	688.1
1977	83,100	1,309.7	53,300	109.1	760.1
1978	89,500	1,536.3	59,200	123.3	932.8
1979	96,100	1,789.7	64,400	133.4	1,092.0
1980	99,700	2,018.1	66,000	134.0	1,202.7
1981	98,300	2,129.8	63,900	129.3	1,259.0
1982	77,800	1,773.1	46,000	86.8	954.5
1983	58,300	1,354.1	34,100	63.7	708.1
1984	58,500	1,460.9	35,200	67.2	784.4
1985	60,500	1,589.2	36,400	70.7	868.0
1986	55,200	1,529.3	32,700	65.0	814.3
1987	46,400	1,358.7	27,500	54.8	715.2

Sources: U.S. Bureau of the Census, "Census of Manufacturers" and "Annual Survey of Manufacturers."

EMPLOYMENT AND COMPENSATION

Metal Forming Machine Tool Industry

Selected Years, 1960 to 1987

	All Employees		Production Workers		
Year	Number	Payroll (Million $)	Number	Man-hours (Million)	Wages (Million $)
1960	22,423	$152.1	17,952	35.8	$100.9
1962	23,396	172.0	18,409	37.0	109.5
1964	23,001	180.3	16,725	37.9	121.6
1966	28,407	244.9	20,911	47.4	164.2
1968	27,900	245.8	19,400	42.9	157.4
1970	28,900	280.6	20,100	43.4	177.3
1972	24,100	265.4	16,600	34.7	163.8
1973	27,000	323.6	18,900	41.8	205.1
1974	29,000	370.8	20,300	43.3	238.2
1975	26,000	343.1	17,700	35.8	208.2
1976	22,900	336.8	15,900	32.0	214.2
1977	23,700	360.7	16,100	32.8	219.4
1978	25,200	415.6	17,000	35.1	253.2
1979	27,000	485.6	18,700	37.5	305.1
1980	26,900	514.1	18,200	35.2	313.2
1981	24,000	496.8	16,000	30.8	294.9
1982	19,500	438.1	12,100	23.2	245.3
1983	15,300	357.0	9,600	17.8	196.0
1984	16,100	407.0	10,500	20.7	242.7
1985	17,700	461.6	11,500	23.0	275.4
1986	16,600	440.5	10,700	21.4	257.3
1987	14,000	420.2	8,900	18.5	240.2

Sources: U.S. Bureau of the Census, "Census of Manufacturers" and "Annual Survey of Manufacturers."

EMPLOYMENT AND COMPENSATION

Metal Cutting Machine Tool Industry

1949 to 1987

	All Employees		Production Workers		
Year	Number	Payroll (Million $)	Number	Man-hours (Million)	Wages (Million $)
1949	52,384	$ 190.4	38,584	74.5	$120.0
1950	54,747	226.8	41,555	88.6	150.6
1951	83,855	396.4	64,029	155.7	281.0
1952	102,735	524.5	79,471	194.6	385.3
1953	99,494	537.6	76,840	175.3	392.6
1954	80,959	432.3	62,106	133.2	302.7
1955	77,063	426.6	58,600	128.1	297.2
1956	85,469	511.9	65,200	147.5	360.6
1957	79,895	470.9	59,600	125.4	319.3
1958	52,864	300.3	35,154	69.6	182.2
1959	52,797	329.5	36,436	72.2	202.0
1960	58,777	370.9	39,487	80.9	223.8
1961	54,901	353.0	36,373	72.7	201.5
1962	58,855	401.8	39,253	81.2	235.0
1963	61,058	438.2	41,008	86.5	272.2
1964	65,078	497.7	44,471	97.3	306.8
1965	70,827	565.0	48,745	108.1	353.7
1966	79,767	673.4	55,279	123.8	427.5
1967	87,200	759.9	60,500	131.8	476.5
1968	84,300	755.2	57,500	120.2	462.3
1969	82,600	791.6	55,300	116.0	477.5
1970	71,300	684.7	45,800	93.2	395.3
1971	54,000	533.1	33,200	64.5	286.2
1972	52,500	573.8	33,400	68.2	325.9
1973	59,900	709.4	39,800	83.3	417.9
1974	65,000	874.4	43,900	92.5	509.8
1975	62,800	850.3	40,800	81.7	486.8
1976	58,100	845.4	37,600	73.5	473.9
1977	59,400	949.0	37,200	76.3	540.7
1978	64,300	1,120.7	42,200	88.2	679.6
1979	69,100	1,304.1	45,700	95.9	786.9
1980	72,800	1,504.0	47,800	98.8	889.5
1981	74,300	1,633.0	47,900	98.5	964.1
1982	58,300	1,335.0	33,900	63.6	709.2
1983	43,000	997.1	24,500	45.9	512.1
1984	42,400	1,053.9	24,700	46.5	541.7
1985	42,800	1,127.6	24,900	47.7	592.6
1986	38,600	1,088.8	22,000	43.6	557.0
1987	32,400	938.5	18,600	36.3	475.0

Sources: U.S. Bureau of the Census, "Census of Manufacturers" and "Annual Survey of Manufacturers."

SELECTED LABOR RATIOS
1968 to 1987

	Payroll per Employee	Prod. Wkrs. % of Total Employment	Annual Man-Hours of Prod. Workers	Average Hourly Earnings, Prod. Workers	Value Added Per Employee	Payroll as % of Value Added	Value Added per Man Hour of Prod. Wkrs.
METAL CUTTING MACHINE TOOL INDUSTRY							
1968	$ 8,958	68%	2,090	$ 3.85	$16,336	55%	$11.46
1969	9,584	67	2,098	4.12	17,452	55	12.43
1970	9,603	64	2,035	4.24	15,597	62	11.93
1971	9,872	61	1,943	4.44	15,181	65	12.71
1972	10,930	64	2,042	4.78	17,175	64	13.22
1973	11,843	66	2,093	5.02	20,269	58	14.58
1974	13,452	68	2,107	5.51	24,877	54	17.48
1975	13,540	65	2,002	5.96	26,119	52	20.07
1976	14,551	64	1,955	6.45	28,642	51	22.64
1977	15,976	63	2,051	7.09	31,416	51	24.46
1978	17,429	66	2,090	7.71	35,257	49	25.70
1979	18,873	66	2,098	8.21	41,010	46	29.55
1980	20,659	66	2,067	9.00	46,005	45	33.90
1981	21,978	64	2,056	9.79	50,335	44	37.97
1982	22,899	58	1,876	11.15	43,160	53	39.56
1983	23,188	57	1,873	11.16	37,505	62	35.13
1984	24,856	58	1,883	11.65	42,925	58	39.14
1985	26,346	58	1,916	12.42	46,729	56	41.93
1986	28,207	57	1,982	12.78	47,249	60	41.83
1987	28,966	57	1,952	13.09	52,429	55	46.80
METAL FORMING MACHINE TOOL INDUSTRY							
1968	$ 8,810	70%	2,211	$ 3.67	$16,247	54%	$10.57
1969	9,664	69	2,166	4.06	16,182	60	10.69
1970	9,709	70	2,159	4.09	16,249	60	10.82
1971	9,898	66	2,056	4.33	14,914	66	11.06
1972	11,012	69	2,090	4.72	17,332	64	12.04
1973	11,985	70	2,212	4.91	20,241	59	13.07
1974	12,786	70	2,133	5.50	21,852	59	14.64
1975	13,196	68	2,023	5.82	23,781	55	17.27
1976	14,707	69	2,013	6.69	27,122	54	19.41
1977	15,219	68	2,037	6.69	30,460	50	22.01
1978	16,492	67	2,065	7.21	33,385	49	23.97
1979	17,985	69	2,005	8.14	37,185	48	26.77
1980	19,112	68	1,934	8.90	38,740	49	29.61
1981	20,700	67	1,925	9.57	40,688	51	31.70
1982	22,467	62	1,917	10.57	39,887	56	33.53
1983	23,333	63	1,854	11.01	41,150	57	35.37
1984	25,280	65	1,971	11.72	48,193	52	37.48
1985	26,079	65	2,000	11.97	52,723	49	40.57
1986	26,536	64	2,000	12.02	46,127	58	35.78
1987	30,014	64	2,079	12.98	51,550	58	39.01

Source: 1963, 1967, 1972, 1977, 1982, 1987: U.S. Bureau of the Census, "Census of Manufacturers," 1982, Industry Series: "Metalworking Machinery and Equipment," MC 82-1-35C and earlier years. Other Years: U.S. Bureau of the Census, "Annual Survey of Manufacturers."

WEEKLY OVERTIME HOURS OF PRODUCTION WORKERS
Selected Industry Groups, 1964 to Date, Annual Averages

Year	Manufacturing	Durable Goods Industry	Nonelectrical Machinery Industry	Metalworking Machinery Industry
1964	3.1	3.3	3.9	5.9
1965	3.6	3.9	4.6	6.7
1966	3.9	4.3	5.5	7.8
1967	3.4	3.5	4.4	6.5
1968	3.6	3.8	4.0	5.4
1969	3.6	3.8	4.5	6.0
1970	3.0	2.9	3.2	4.3
1971	2.9	2.9	2.6	2.8
1972	3.5	3.6	3.8	4.9
1973	3.8	4.1	4.7	6.4
1974	3.2	3.4	4.3	5.8
1975	2.6	2.5	3.0	3.3
1976	3.1	3.1	3.1	4.0
1977	3.5	3.7	4.0	5.5
1978	3.6	3.8	4.3	5.9
1979	3.3	3.5	4.0	5.7
1980	2.8	2.8	3.4	4.8
1981	2.8	2.8	3.2	4.1
1982	2.3	2.2	2.2	2.7
1983	3.0	3.0	2.7	3.3
1984	3.4	3.6	3.7	4.9
1985	3.3	3.5	3.4	4.6
1986	3.4	3.5	3.4	4.6
1987	3.7	3.8	4.0	4.7
1988	3.9	4.1	4.4	4.6

Sources: U.S. Bureau of Labor Statistics, "Employment and Earnings," monthly issues and annual supplements.

WORK INJURY RATES
By Industry, 1987

	Incidence Rates (per 100 Employees)			
Industry	Total Recordable Cases	Lost Workday Cases	Nonfatal Cases Without Lost Workdays	Average Lost Workdays Per Lost Workday Case
Manufacturing	11.9	5.3	6.7	18.0
Fabricated Metal Products	17.0	7.2	9.8	16.9
Metal Stampings	18.4	7.5	10.9	18.7
Machinery Except Electrical	11.3	4.4	6.9	16.5
Engines and Turbines	12.7	5.2	7.5	16.5
Construction and Related Machinery	15.2	6.1	9.1	16.5
Metalworking Machinery	12.1	4.0	8.0	16.3
Machine Tools, Metal Cutting Types	10.3	3.7	6.6	16.9
Machine Tools, Metal Forming Types	15.4	5.7	9.7	18.0
Special Industry Machinery	13.2	4.7	8.5	16.4
General Industrial Machinery	12.7	4.9	7.8	16.7
Transportation Equipment	13.5	5.7	7.8	18.5
Motor Vehicles and Equipment	15.2	6.6	8.5	17.9

Note: Data represents work-related injuries and illnesses in comparable industries.

Source: U.S. Department of Labor, Bureau of Labor Statistics.

HOURLY COMPENSATION COST FOR PRODUCTION WORKERS
NON-ELECTRICAL MACHINERY
(U.S. Dollars)

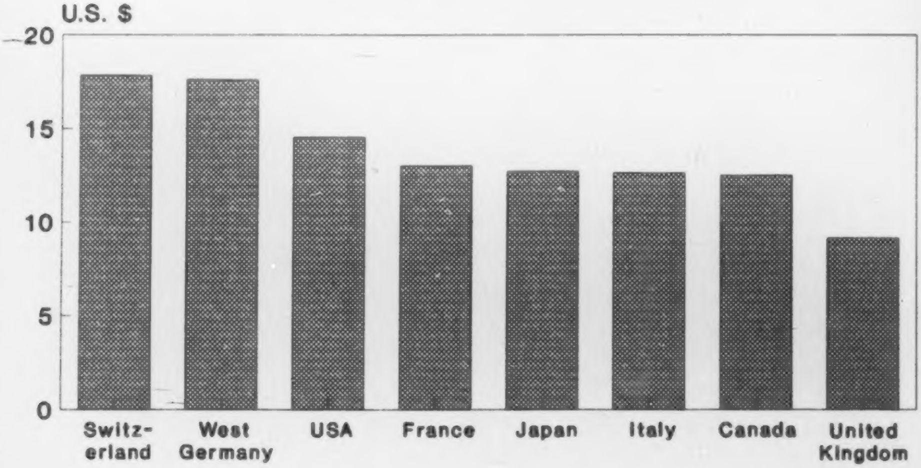
Country	1984	1985	1986	1987
United States	$13.56	$13.97	$14.38	$14.51
Canada	11.90	11.27	11.43	12.47
Mexico (a)	2.25	2.31	1.82	1.95
Germany (Federal Republic)	9.71	9.99	13.93	17.60
Italy	7.58	7.89	10.57	12.59
France	7.67	7.86	10.69	12.99
United Kingdom	6.09	6.37	7.67	9.11
Switzerland (b)	9.99	9.92	14.29	17.84
Japan	7.36	7.48	10.82	12.69
Taiwan	1.70	1.67	1.95	2.47
South Korea	1.60	1.58	1.64	2.05
MACHINE TOOL INDUSTRY				
United States	13.65	14.19	14.71	14.85
Japan	7.19	7.67	10.90	12.80

(a) Includes farm machinery & tools and office & computing equipment.

(b) Includes primary metals, metal products and machinery and equipment.

Source: U.S. Bureau of Labor Statistics, Branch of International Comparisons.

Average Hourly Compensation
of Production Workers
Non-Electrical Machinery, 1987



AVERAGE HOURLY EARNINGS IN THE NON-ELECTRICAL MACHINERY INDUSTRY

In Selected Countries, 1983 to 1987

(U.S. Dollars)

Country	1983	1984	1985	1986	1987	Avg. Annual % Change 1983–87
Canada	$8.96	$8.82	$ 8.39	$ 8.71	$ 9.25	0.8%
France	4.66	4.32	4.42	5.96	7.13	11.2
Germany, West	6.21	5.72	5.84	8.22	10.35	13.6
Japan	7.15	7.37	7.49	10.72	12.61	15.2
United Kingdom	5.00	4.73	5.00	6.02	7.12	9.2
United States	9.55	9.96	10.29	10.57	10.70	2.9

Sources: International Labour Office, *Year Book of Labour Statistics, 1988.*

AVERAGE HOURLY COMPENSATION OF PRODUCTION WORKERS

In Selected Industry Groups, 1987

(U.S. Dollars)

Country	All Manufacturing	Machinery, Except Electrical	Electrical Equipment	Motor Vehicles
United States	$13.46	$14.51	$13.56	$21.26
Canada	11.97	12.47	11.34	14.58
France	12.42	12.99	12.27	13.41
West Germany	16.87	17.60	16.25	21.38
Italy	12.13	12.59	12.03	12.78
Japan	11.14	12.69	10.10	14.10(a)
Sweden	15.12	14.90	14.55	15.43
United Kingdom	8.97	9.11	8.22	10.62

(a) Includes motorcycle manufacturing.

Source: U.S. Department of Labor, Bureau of Labor Statistics.

8

FINANCE

Publicly available data on the financial status of the machine tool industry is scarce. A few sources are the annual reports of the publicly owned machine tool companies and of other companies that produce machine tools. Government statistics on the capital expenditures for "structures and additions" and for "machinery and equipment" in the metal cutting and metal forming machine tool industries are an indirect measure of financial health.

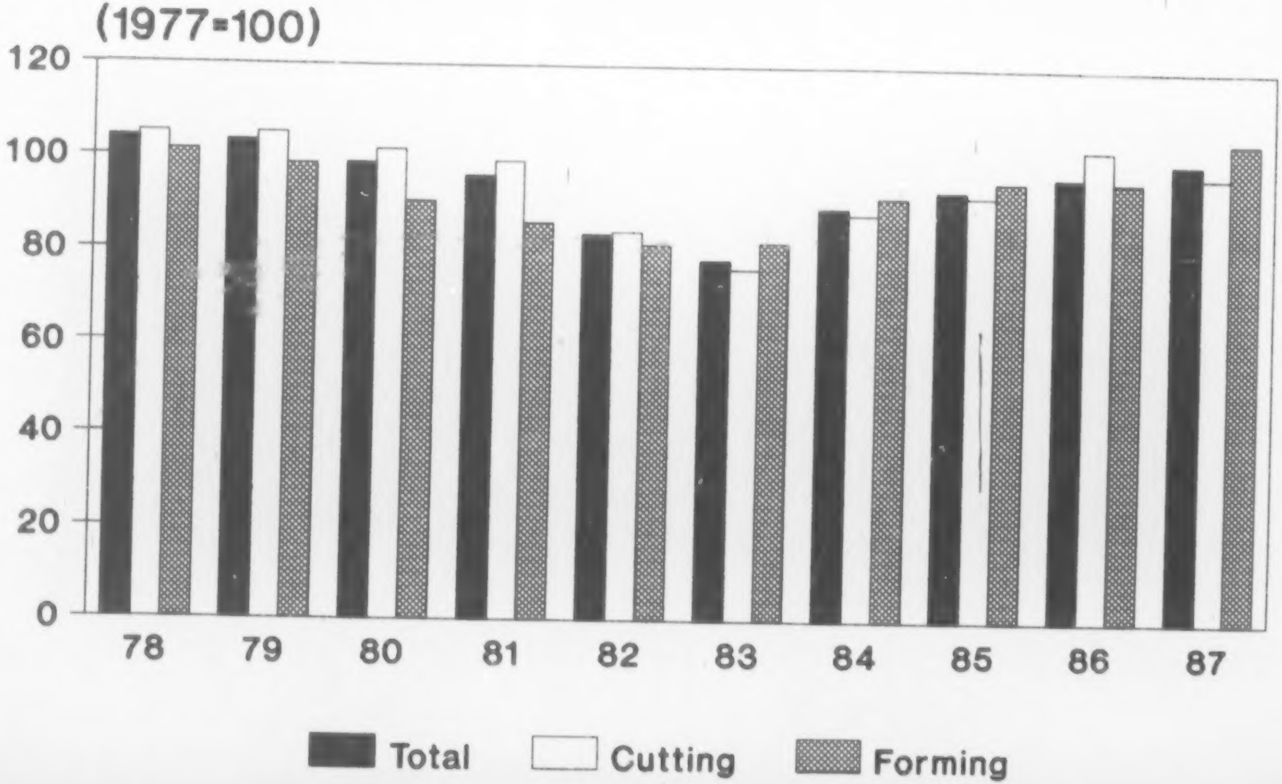
Selected financial indicators for a machine tool composite from the "Industry Surveys" of Standard and Poor's Corporation are included in this chapter. The machine tool composite figures are based on a weighted average of individual company data. Prior to 1980, six companies formed the basis of the composite. Since 1980, only five firms have been included. However, since the figures presented are weighted according to the total market value of equity stock outstanding in these firms, comparisons between data before and after 1980 should prove valid.

Each indicator from "Industry Surveys" is an index based on average value per share of outstanding stock. We have converted these indicators from the original base of 1941–1943 = 10 to 1982 = 100 to conform with other indexes in this publication. The financial indicators for the composite dc not necessarily represent an average for the entire machine tool industry, but given the scarcity of financial information, are a valuable addition to this chapter.

Data collected by an outside research group for the National Machine Tool Builders' Association indicate that the rate of profit of machine tool manufacturers tends to be somewhat higher than that of all manufacturing industries during good times, but drastically worse in less prosperous periods.

It should be emphasized that all the data in this section are in current dollars and that in periods of rapid inflation the true state of earnings and capital accumulation is seriously distorted. In particular, an inflationary environment leads to the overstatement of "inventory profits" and the understatement—relative to replacement costs—of depreciation charges on capital equipment.

Machine Tool Industry Productivity Indexes of Output Per Employee



SELECTED FINANCIAL RATIOS FOR CORPORATIONS (a)
IN SELECTED INDUSTRIES, 1988

Industry	% Net Operating Profit on Sales	% Earnings After Taxes On Sales	% Earnings After Taxes On Net Worth	% Depreciation and Amortization On Net Sales	Times Inventory Turnover	Current Assets to Current Liablities
Machine Tools	2.3%	1.5%	3.7%	2.4%	3.4	2.0
All Manufacturing Corporations	7.3	5.9	16.1	3.9	7.0	1.5
Durable Manufactures	6.1	5.1	14.0	3.6	5.7	1.6
Electrical Machinery	6.4	5.7	14.1	6.2	5.2	1.6
Machinery, Except Electrical	5.4	5.8	11.6	5.8	5.5	1.8
Motor Vehicles	4.2	5.1	15.6	6.5	13.1	1.5
Chemical and Allied Products	9.9	9.3	21.1	8.9	7.1	1.5

(a) Excludes corporations with less than $250,000 in assets, except for "Machine Tools."

Source: U.S. Department of Commerce, Bureau of Census, "Quarterly Financial Report for Manufacturing Corporations" and NMTBA.

GROSS BOOK VALUE OF DEPRECIABLE ASSETS (a)
Machine Tool Industry, 1968 to Date
(Millions of Dollars)

		Metal Cutting Industry			Metal Forming Industry		
Year	Total	Total	Structures and Additions	Machinery and Equipment	Total	Structures and Additions	Machinery and Equipment
1968	$1,161	$ 845	$253	$ 592	$316	$ 94	$222
1969	1,224	889	269	620	335	98	237
1970	1,235	884	270	614	351	109	242
1971	1,241	874	272	602	367	114	253
1972	1,228	841	263	578	387	120	267
1973	1,251	851	259	592	400	121	279
1974	1,324	895	260	635	429	131	298
1975	1,356	937	266	671	419	125	294
1976	1,412	1,000	279	721	412	127	285
1977	1,498	1,044	310	734	454	133	321
1978	1,698	1,180	340	840	518	145	373
1979	1,892	1,336	383	953	556	155	401
1980	2,052	1,469	416	1,053	583	164	420
1981	2,324	1,599	449	1,150	725	205	520
1982	2,435	1,692	475	1,217	743	203	541
1983	2,316	1,677	472	1,205	639	176	464
1984	2,233	1,638	467	1,171	595	165	430
1985	2,289	1,632	461	1,172	657	181	476
1986	(b)	(b)	(b)	(b)	(b)	(b)	(b)

(a) Includes all fixed depreciable assets on the books of establishments at year end. Values represent actual cost of assets at the time they were acquired. Total includes all buildings, structures, machinery and equipment. Machinery and equipment includes production, office and transportation equipment.

(b) Data was not collected in 1986.

Source: U.S. Bureau of the Census, "Census of Manufacturers," 1967, 1972, 1977, 1982; U.S. Bureau of the Census, "Annual Survey of Manufacturers."

NEW CAPITAL EXPENDITURES IN THE MACHINE TOOL INDUSTRY

1954 to Date

(Millions of Dollars)

		Metal Cutting Industry			Metal Forming Industry		
Year	Total	Total	Structures and Additions	Machinery and Equipment	Total	Structures and Additions	Machinery and Equipment
1954	NA	$ 37.7	$11.2	$ 26.5	NA	NA	NA
1955	NA	44.0	NA	NA	NA	NA	NA
1956	NA	49.2	NA	NA	NA	NA	NA
1957	NA	39.7	NA	NA	NA	NA	NA
1958	$ 30.5	18.8	1.9	16.9	$11.7	$ 3.8	$ 7.9
1959	31.9	22.2	NA	NA	9.7	NA	NA
1960	37.4	24.8	NA	NA	12.6	NA	NA
1961	26.4	18.7	NA	NA	7.7	NA	NA
1962	39.3	26.6	NA	NA	12.7(a)	NA	NA
1963	39.6	28.8	5.4	23.4	10.8	2.1	8.7
1964	71.7	41.7	11.0	30.7	30.0(a)	7.5(a)	22.5(a)
1965	74.2	53.7	10.2	43.5	20.5	4.4(a)	16.1
1966	102.5	74.9	17.1	57.8	27.6	6.2(a)	21.4(a)
1967	104.9	78.7	19.3	59.3	26.2	5.7	20.5
1968	90.9	62.3	9.1	53.2	28.6	7.7	20.9
1969	105.0	75.5	21.8	53.7	29.5	7.7	21.8
1970	72.7	49.3	11.7	37.6	23.4	7.8	15.6
1971	39.1	28.7	4.6	24.1	10.4	1.6	8.8
1972	52.7	35.2	7.2	28.0	17.5	4.7	12.8
1973	65.9	38.4	7.3	31.1	27.5	4.0	23.4
1974	93.3	58.9	10.6	48.3	34.4	8.6	25.9
1975	76.1	52.2	7.9	44.2	23.9	4.0	19.9
1976	93.5	65.2	11.2	54.0	28.3	10.8	17.5
1977	132.4	107.9	19.1	88.8	24.5	2.6	21.9
1978	142.4	102.0	22.4	79.6	40.4	5.8	34.6
1979	199.4	147.6	31.8	115.8	51.8	9.7	42.1
1980	241.0	171.6	39.8	131.8	69.4	14.5	54.9
1981	296.2	233.2	52.3	180.9	63.0	12.8	50.2
1982	190.3	152.2	32.8	119.4	38.1	4.3	33.8
1983	132.9	104.8	18.6	86.2	28.1	4.6	23.5
1984	139.8	108.8	19.2	89.7	31.0	3.8	27.3
1985	135.3	91.6	14.6	77.0	43.7	9.3	34.4
1986	96.6	62.7	13.3	49.4	33.9	5.1	28.8

NA - Not Available.

(a) Standard errors exceeding 15%, not consistent with other Census data in metal forming.

NOTE: Change of definition of machine tool industry makes comparisons before 1957 difficult.

Source: U.S. Bureau of the Census, "Census of Manufacturers," 1963, 1967, 1972, 1977, 1982; U.S. Bureau of the Census, "Annual Survey of Manufacturers."

MACHINE TOOL FINANCIAL INDICATORS (a)

Per Share Data

(1982 = 100)

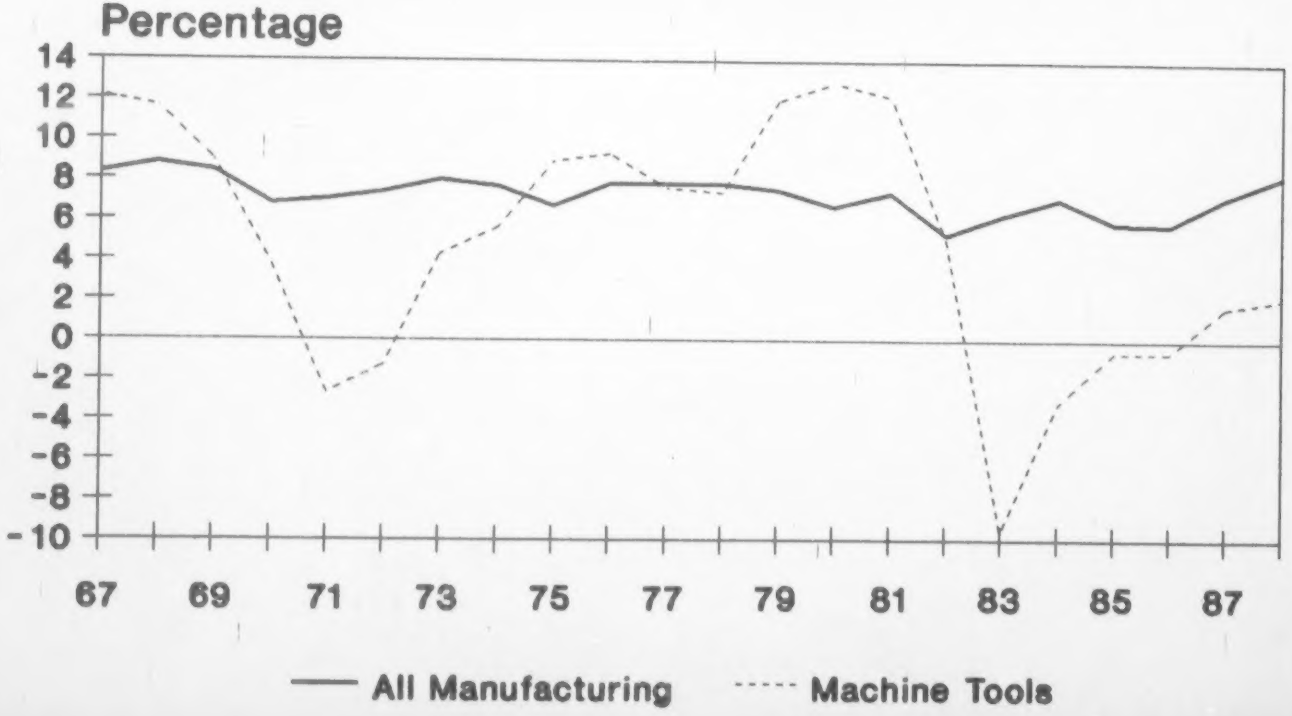
Year	Sales	Operating Profit	Depreciation	Book Value	Working Capital	Capital Expenditures
1958	13.3	7.2	15.7	25.5	24.5	9.5
1959	14.5	7.6	16.1	24.9	23.7	7.9
1960	17.1	12.8	16.9	24.9	22.9	11.3
1961	16.9	14.1	16.8	25.2	23.5	8.4
1962	18.6	13.7	15.2	25.6	24.4	8.3
1963	19.3	17.9	17.3	26.4	25.1	11.4
1964	20.3	27.5	19.7	24.6	23.0	17.6
1965	24.1	33.8	22.0	26.9	28.6	19.1
1966	29.0	42.8	25.2	29.7	32.0	26.3
1967	31.2	48.2	29.9	33.0	34.8	18.5
1968	30.9	48.4	35.1	35.2	35.4	31.0
1969	31.4	42.3	35.6	36.3	36.0	29.0
1970	28.0	20.5	36.1	36.3	37.5	22.6
1971	22.9	7.8	33.7	35.6	35.5	17.4
1972	27.6	15.5	33.4	35.0	36.4	27.8
1973	37.3	35.3	34.7	36.8	37.4	40.3
1974	45.3	39.3	37.2	38.4	53.3	45.8
1975	48.9	39.9	40.9	39.7	55.5	32.6
1976	45.9	38.1	42.6	41.1	53.6	28.9
1977	52.2	55.2	45.4	43.7	55.0	36.6
1978	61.7	79.8	47.0	49.2	59.1	45.9
1979	74.2	113.1	53.2	58.6	66.1	68.7
1980	96.6	134.1	65.3	74.8	91.6	100.3
1981	103.4	137.2	77.4	84.0	94.6	90.5
1982	100.0	100.0	100.0	100.0	100.0	100.0
1983	62.6	2.6	108.2	89.8	89.2	59.5
1984	74.0	39.5	106.6	90.2	86.9	94.7
1985	86.9	54.2	119.6	84.6	89.4	79.4
1986	90.9	53.2	121.0	85.4	89.8	61.0
1987	90.0	45.4	164.2	75.6	85.1	41.0

(a) Data in this table prior to 1980 represents a composite of financial information for six publicly held machine tool companies. Companies included in the group have changed through time. Since 1980, the composite has included five companies. However, since the indicators are weighted according to the market value of shares outstanding, a shift in the composite's composition should not affect the indicators. Therefore, pre- and post-1980 data are comparable.

Source: Standard & Poor's Corporation, "Industry Surveys.".

Net Income Before Taxes as a Percent of Sales

All Manufacturing & Machine Tools



AVERAGE NET INCOME OF ALL MANUFACTURING CORPORATIONS AND MACHINE TOOL COMPANIES SURVEYED

1969 to Date

	NET INCOME BEFORE TAXES			
	As Percent of Sales		As Percent of Assets	
Year	All Manufacturers	Machine Tool Manufacturers	All Manufacturers	Machine Tool Manufacturers
1969	8.4%	8.9%	10.7%	10.6%
1970	6.8	3.8	8.3	4.8
1971	7.0	(2.7)	8.7	(2.7)
1972	7.4	(1.3)	9.5	(1.4)
1973	8.0	4.3	11.0	4.8
1974	7.7	5.6	10.7	7.2
1975	6.7	8.9	8.8	12.7
1976	7.8	9.3	10.6	12.3
1977	7.8	7.6	13.5	12.8
1978	7.8	7.4	10.7	11.8
1979	7.5	12.0	11.1	16.9
1980	6.7	12.9	9.5	19.4
1981	7.4	12.2	10.5	18.0
1982	5.3	5.0	6.7	6.1
1983	6.3	(9.6)	7.9	(8.7)
1984	7.1	(3.2)	8.9	(3.4)
1985	5.9	(0.6)	7.1	(0.7)
1986	5.8	(0.6)	6.5	(b)
1987	7.2(a)	1.7	8.0(a)	2.1
1988	8.3(a)	2.1	9.5(a)	2.5

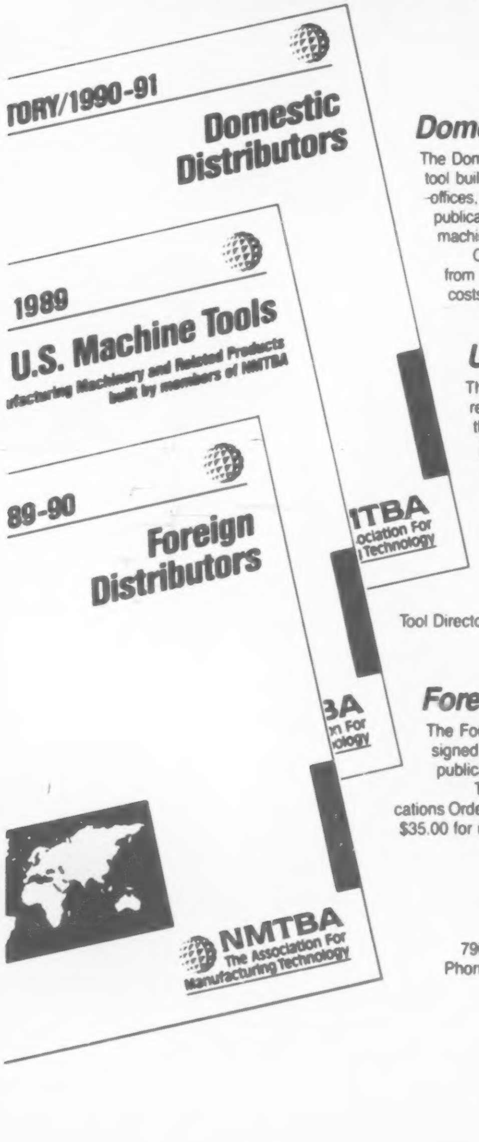
(a) Excludes corporations with less than $250,000 in assets.
(b) Net income before taxes was less than 0.1%.

Note: Figures in parentheses represent negative figures.

Sources: U.S. Department of Commerce, Bureau of Census, "Quarterly Financial Report for Manufacturing Corporations" and NMTBA.

Who's who in machine tools?

Find what you need and who you need to know in machine tools and manufacturing technology


TORY/1990-91
Domestic Distributors
1989
U.S. Machine Tools
ufacturing Machinery and Related Products built by members of NMTBA
89-90
Foreign Distributors
NMTBA
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Domestic Distributors Directory

The Domestic Distributors Directory is designed to apprise machine tool builders of distribution sources within the industry—field sales offices, distributors, agents and manufacturers' representatives. This publication contains a complete listing of domestic distributors of machine tools.

Copies of the Domestic Distributors Directory are available from the Publications Order Clerk at NMTBA. This publication costs $25.00 for members, and $30.00 for non-members.

U.S. Machine Tool Directory

The U.S. Machine Tool Directory contains a complete cross-referenced listing of all NMTBA members and the products they manufacture. This publication is divided into three parts. Part I is a foreign language index. The second part of this directory lists specific product types, the NMTBA member companies which manufacture these products, and includes a brief description of the product.

The last part of this directory gives complete information on each NMTBA member, including full address, phone and telex numbers, as well as additional information on the equipment they manufacture.

You can obtain a free copy of the U.S. Machine Tool Directory by contacting the Publications Order Clerk at NMTBA.

Foreign Distributors Directory

The Foreign Distributors Directory is another NMTBA service designed to assist member builders in expanding their exports. This publication lists foreign distributors of machine tools.

To receive a copy of this directory, please contact the Publications Order Clerk at NMTBA. The Foreign Distributors Directory costs $35.00 for members, and $40.00 for non-members.

NMTBA
The Association For Manufacturing Technology

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Phone (703) 893-2900/TLX 353819/FAX (703) 893-1151

9

MACHINE TOOLS IN USE

American Machinist magazine has been conducting surveys of metalworking equipment in use by American industry for over 50 years - a total of 13 complete Inventories. Through the years the impact of advancing technology, shifting industrial classifications and improved statistical techniques have brought about changes in procedures for compilation and publication of inventory data.

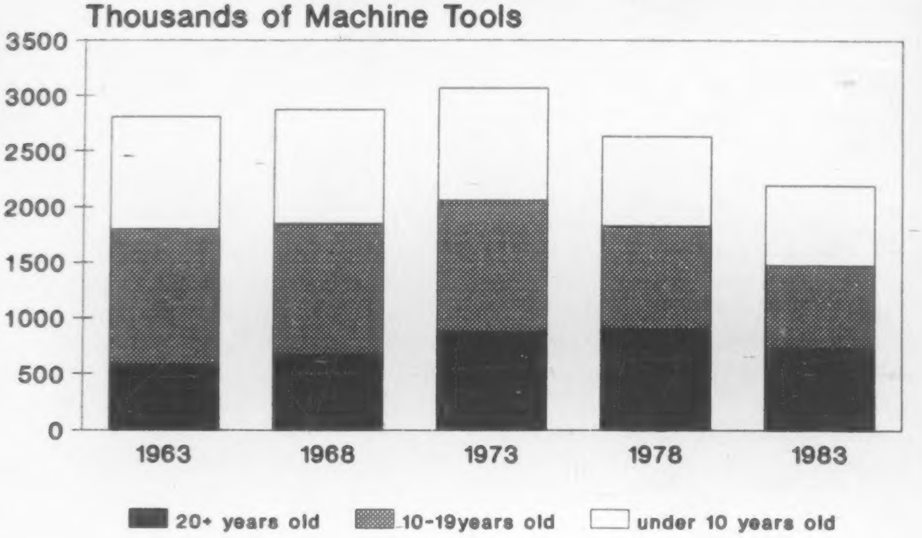
Through 1973, the Inventory was conducted every five years covering all the metalworking industries. The 12th Inventory was conducted over a period of three years with approximately one-third of metalworking surveyed each year from 1976 to 1978. The latest Inventory, the 13th of the series, returned to the format employed in the first eleven, i.e. surveying all metalworking industries in one year. The 13th Inventory was conducted in 1983 and its results were published late in the year. All of the tables and charts in this chapter have been updated to reflect this latest compilation.

The American Machinist Inventory is based on a sample survey and it is the nature of such surveys that the reliability of the data is greatest in the broader categories. The survey's reliability necessarily decreases as results are broken down into smaller and smaller cells. A broad breakdown, such as "grinding machine tools in the North Central States," will therefore tend to be more reliable than a very detailed breakdown such as "circular saws, over 20 years old, in New Mexico and Texas." Another limitation is the coverage of the survey. While the data compiled are believed to accurately reflect the number and types of machine tools in use in U.S. metalworking industries, the user should be aware of the sample's limitations. For all but the 12th Inventory, all of metalworking manufacturing was surveyed to arrive at tabulated results. In the 12th Inventory, estimates were made for metalworking plants with fewer than twenty employees as these establishments were not surveyed. Tables containing these estimates are so noted. Secondly, the coverage of the survey is based on employment totals, not the number of plants. For example, in the 1983 Inventory, the number of plants responding to the survey comprised only 7% of the total number of establishments with more than twenty employees recognized by the U.S. Bureau of Census. However, this 7% represented an employee base of approximately 25% of metalworking employment. This level of representation bolsters the survey's reliability.

Also included in this chapter is a chart of Inventory data showing the number of machine tools in use in seven industrial nations and their average age distribution. This chart brings to light the fact that while the U.S. has a very large stock of machine tools it is also a relatively old, somewhat obsolescent stock.

Additional information concerning the American Machinist Inventory may be obtained from American Machinist & Automated Manufacturing, 122 East 42nd Street, Suite 2119, New York, New York 10168.

Machine Tools in Use in Metalworking Industries



TOTAL MACHINE TOOLS IN THE UNITED STATES
Estimated Number, 1983

Use or Location	Total	Metal Cutting	Metal Forming
TOTAL	2,896,754	2,247,833	648,921
Metalworking Industries (a)	2,192,754	1,702,833	489,921
Other Industries	380,000	275,000	105,000
Training	74,000	70,000	4,000
In Storage and Surplus	250,000	200,000	50,000

(a) As used here, metalworking industries are: furniture industry (SIC 25), primary metals industry (SIC 33), fabricated metal products industry (SIC 34), non-electrical machinery industry (SIC 35), electrical machinery industry (SIC 36), transportation equipment industry (SIC 37), precisioninstruments industry (SIC 38), and miscellaneous manufacturing industry (SIC 39).

Source: American Machinist, "13th Inventory of Metalworking Equipment, 1983."

MACHINE TOOLS IN USE
Metalworking Industries,1963 to 1983
(Number in Thousands and Percent of Total)

Year-Industry	Total	By Age Under 10 Years Number	 %	 10–19 Years Number	 %	 Over 20 Years Number	 %	With Numerical Control Number	 %
1963									
All Metalworking	2,808.5	1,011.1	36.0	1,215.6	43.3	581[illegible]	20.7	NA	NA
Non-Electrical Machy.	951.9	315.0	33.1	424.0	44.5	21[illegible]	22.4	NA	NA
Metalworking Machy.	210.6	77.9	37.0	90.3	42.9	[illegible]	20.1	NA	NA
Machine Tools	NA	NA	NA	NA	NA	NA	NA	NA	NA
1968									
All Metalworking	2,869.8	1,021.4	35.6	1,176.2	41.0	672.2	23.4	14.2	0.5
Non-Electrical Machy.	912.5	325.3	35.6	350.4	38.4	236.9	26.0	6.8	0.7
Metalworking Machy.	248.7	97.1	39.0	93.9	37.8	57.7	23.2	1.8	0.7
Machine Tools	NA	NA	NA	NA	NA	NA	NA	NA	NA
1973									
All Metalworking	3,065.5	1,009.8	32.9	1,185.1	38.7	870.6	28.4	28.6	0.9
Non-Electrical Machy.	1,103.6	379.8	34.4	410.9	37.2	312.9	28.4	15.1	1.4
Metalworking Machy.	274.5	105.5	38.4	102.3	37.3	66.6	24.3	3.3	1.2
Machine Tools	57.1	17.2	20.1	20.0	35.0	19.9	34.9	1.5	2.6
1976-1978 (a, b)									
All Metalworking	2,630.7	802.6	30.5	927.2	35.2	900.9	34.2	52.9	2.0
Non-Electrical Machy.	961.0	314.8	32.8	337.5	35.1	308.7	32.1	29.7	3.1
Metalworking Machy.	242.1	82.1	33.9	87.8	36.3	72.2	29.8	6.9	3.1
Machine Tools	69.5	16.0	23.0	25.6	36.8	27.8	40.0	2.6	3.7
1983 (b)									
All Metalworking	2,192.8	717.9	32.7	746.4	34.0	728.5	33.2	103.3	4.7
Non-Electrical Machy.	805.3	285.3	35.4	272.4	33.8	247.6	30.7	52.5	6.5
Metalworking Machy.	202.0	74.1	36.7	68.1	33.7	59.8	29.6	11.8	5.8
Machine Tools	49.2	12.6	25.7	14.4	29.2	22.2	45.1	3.4	6.9

NA - Not Available.

(a) Includes estimates of machines in plants with less than 20 employees.
(b) Machines 20 years old are included in the "Over 20 Years" category.

Source: McGraw Hill, Inc. "American Machinist," Inventories of Metalworking Equipment, 1963 - 1983.

MACHINE TOOLS IN USE IN SEVEN INDUSTRIAL NATIONS
By Number and Age
(Number in Thousands)

Country	Year	Total	Percent of Total Under 10 Years	 10–19 Years	 20 Years & Up
United States	1983	2,193	32.7%	34.0%	33.2%
West Germany (a)	1980	1,250	34.0	18.0	48.0
United Kingdom (b)	1982	775	42.3	30.5	27.2
Japan(c)	1981	918	36.4	28.0	35.6
France	1980	761	35.0	33.0	32.0
Italy (d)	1975	541	38.1	33.9	28.0
Canada	1978	211	35.8	30.4	33.8

(a) Machine tool age classifications are as follows: Under 10 Years, 10 to 14 Years, 15 Years & Up.
(b) Machine tool age classifications are as follows: Under 6 Years, 6 to 19 Years, 20 Years & Up.
(c) Machine tool age classifications are as follows: Under 8 Years, 8 to 12 Years, 20 Years & Up.
(d) Machine tool age classifications are as follows: Under 9 Years, 9 to 17 Years, Over 17 Years.

Source: McGraw Hill, Inc. "American Machinist."

MACHINE TOOLS IN USE
Metalworking Industries, 1983
(Number in Thousands and Percent of Industry Total)

		By Age						With Numerical Control	
		Under 10 Years		10–19 Years		20 Years and Over			
Industry	Total	Number	%	Number	%	Number	%	Number	%
TOTAL	2,192.8	717.9	32.7	746.4	34.0	728.5	33.2	103.3	4.7
Metal Furniture, Fixtures	26.6	6.9	26.0	11.3	42.3	8.4	31.7	0.6	2.3
Primary Metals	117.8	34.4	29.2	39.6	33.6	43.8	37.2	2.7	2.3
Fabricated Metal Products	518.9	149.4	28.8	179.3	34.5	190.3	36.7	14.5	2.8
Fab. Structural Metal Product	120.3	41.7	34.7	42.1	35.0	36.5	30.3	4.3	3.6
Screw Machine Products	85.7	21.6	25.2	31.3	36.5	32.8	38.3	1.4	1.6
Metal Stampings	96.2	23.6	24.6	32.3	33.6	40.3	41.9	1.9	1.9
Other Fab. Metal Products	216.8	62.4	28.8	73.6	33.9	80.8	37.3	6.9	3.2
Non-Electrical Machinery	805.3	285.3	35.4	272.4	33.8	247.6	30.7	52.5	6.5
Metalworking Machinery	202.0	74.1	36.7	68.1	33.7	59.8	29.6	11.8	5.8
Machine Tools	49.2	12.6	25.7	14.4	29.2	22.2	45.1	3.4	6.9
Special Industry Machy.	80.4	24.1	29.9	27.1	33.8	29.2	36.3	4.0	5.0
General Industrial Machy.	110.0	31.9	29.0	39.5	35.9	38.6	35.1	5.8	5.3
Other Non-Elec. Machy.	412.9	155.3	37.6	137.6	33.3	120.0	29.1	30.9	7.5
Electrical Machinery	245.7	85.3	34.7	90.9	37.0	69.4	28.3	10.8	4.4
Elec. Industrial Apparatus	41.4	13.8	33.2	15.0	36.3	12.6	30.5	1.8	4.3
Communications Equipment	36.6	14.0	38.4	13.6	37.1	9.0	24.5	2.6	7.1
Other Elec. Machinery	167.7	57.5	34.3	62.3	37.2	47.8	28.5	6.4	3.8
Transportation Equipment	303.0	89.0	29.4	92.7	30.6	121.2	40.0	15.3	5.0
Motor Vehicles Equip.	153.2	38.9	25.4	46.8	30.5	67.6	44.1	4.1	2.7
Aircraft and Parts	97.7	34.2	35.0	33.3	34.1	30.2	30.9	8.8	9.0
Other Trans. Equip.	52.0	15.9	30.6	12.6	24.2	23.5	45.2	2.4	4.6
Precision Instruments	109.6	41.3	37.7	40.0	36.5	28.3	25.8	4.9	4.4
Misc. Mfg. Industries	65.9	26.2	39.7	20.2	30.7	19.5	29.6	2.1	3.2

Note: Individual items may not add to totals due to rounding.

Source: American Machinist, "The 13th American Machinist Inventory of Metalworking Equipment, 1983."

MACHINE TOOLS IN USE IN METALWORKING INDUSTRIES
By Major User Industry, 1983
(Number in Thousands)

	Total Machine Tools		Metal Cutting Machines		Metal Forming Machines	
Using Industry	Number	%	Number	% Under 10 Yrs. Old	Number	% Under 10 Yrs. Old
TOTAL	2,192.8	100.0%	1,702.8	34%	489.9	27%
Furniture & Fixtures	26.6	1.2%	10.8	34%	15.9	21%
Primary Metals Industries	117.8	5.4	88.5	30	29.3	29
Fabricated Metal Products	518.9	23.7	326.0	32	192.9	25
Ordnance & Accessories	24.3	1.1	20.7	20	3.7	18
Non-Electrical Machinery	805.3	36.7	714.8	36	90.5	30
Electrical Machy. & Equipment	245.7	11.2	177.9	36	67.7	31
Transportation Equipment	303.0	13.8	248.6	30	54.4	27
Precision Instruments	109.6	5.0	91.3	38	18.3	33
Miscellaneous Mfg. Industries	65.9	3.0	45.0	47	20.9	23

Source: American Machinist, "13th Inventory of Metalworking Equipment, 1983."

GEOGRAPHICAL DISTRIBUTION OF MACHINE TOOLS IN USE IN METALWORKING INDUSTRIES, 1983

(By Number and Age Distribution)

	Metal Cutting Machines					Metal Forming Machines					No. Units with NC		% Plants with NC		
Region and Area	Total Units	0–4 Years	5–9 Years	10–19 Years	20 Years & Over	Total Units	0–4 Years	5–9 Years	10–19 Years	20 Years & Over	Cutting	Forming	Turning	Mach. ctrs.	Punching
U.S.A.	1,702,833	14%	20%	34%	32%	489,921	9%	18%	36%	37%	94,012	9,296	26%	19%	8%
NORTHEAST															
Boston	101,472	15%	21%	33%	32%	27,531	9%	18%	34%	39%	5,641	504	28%	20%	8%
Bridgeport-Hartford	67,581	14	18	34	34	16,389	9	17	36	39	3,893	197	28	24	3
New York-Newark	120,299	15	22	35	28	38,954	10	18	37	35	6,707	936	18	16	6
Buffalo-Syracuse	49,202	12	18	33	37	11,713	9	17	34	41	2,375	154	31	23	10
Philadelphia-Camden	77,535	14	21	34	32	25,286	9	18	35	37	4,057	490	28	19	8
Pittsburgh-Wheeling	47,239	12	20	33	35	13,634	7	16	33	44	2,390	192	31	23	7
SOUTHEAST															
Baltimore	14,065	13	20	34	34	4,212	8	18	35	39	592	86	23	14	14
Richmond	61,169	14	19	35	32	17,231	9	18	38	35	3,340	352	32	23	11
Atlanta-New Orleans	112,738	15	20	33	32	36,520	10	18	36	35	6,362	866	22	13	8
MIDWEST															
Cleveland	75,272	13	19	34	34	21,717	8	17	35	40	3,827	269	27	18	5
Toledo	21,624	10	17	32	40	6,632	7	15	36	42	841	55	27	18	10
Cincinnati-Louisville	57,956	13	19	34	35	16,496	8	16	37	39	2,868	241	29	22	9
Detroit	106,983	13	18	32	37	27,936	8	16	34	42	5,134	319	24	18	3
Indianapolis	45,936	12	18	34	36	14,234	8	16	34	41	1,920	190	28	13	5
Chicago	218,646	13	20	34	32	68,100	9	18	36	37	12,336	1,333	23	16	9
Milwaukee	60,777	12	19	34	35	15,879	8	18	36	38	3,210	260	26	21	9
Minneapolis-St. Paul	34,421	13	21	35	31	9,613	9	18	37	36	1,703	189	31	21	11
St. Louis	49,624	13	20	35	33	18,373	9	17	37	37	1,979	295	21	14	10
SOUTHWEST															
Kansas City - Tulsa	41,236	16	21	32	31	10,470	10	19	35	36	2,677	220	39	27	10
Dallas-Houston	79,137	18	21	31	30	19,848	12	19	35	34	6,110	473	35	20	7
MOUNTAIN AND PACIFIC															
Denver	32,341	15	22	33	30	8,829	10	19	35	36	1,742	238	23	18	12
Seattle-Portland	27,619	15	22	33	31	6,936	11	19	36	34	1,388	155	20	17	6
San Francisco	44,650	16	21	33	29	11,817	11	19	37	33	2,504	292	18	16	9
Los Angeles	155,311	17	22	34	28	41,571	11	19	37	33	10,416	990	28	21	7

Source: American Machinist, "13th Inventory of Metalworking Equipment, 1983."

MACHINE TOOLS IN USE IN METALWORKING INDUSTRIES
By Major Type and Age, 1983

Type of Machine Tool	Plants With	Total Units	Change Since '78	Percent of Total	0–4 Years	5–9 Years	10–19 Years	20 Years and Over
GRAND TOTAL	—	2,192,754	−8%	100.0%	13%	20%	34%	33%
Non-NC Grinding Machines	75%	383,027	0%	17.5%	14%	22%	34%	31%
Non-NC Turning Machines	77	332,327	−14	15.2	10	16	35	40
Non-NC Drilling Machines	74	281,453	−18	12.8	10	18	36	36
Non-NC Milling Machines	74	218,479	−5	10.0	12	20	36	32
Mechanical Presses	43	198,973	−15	9.1	6	14	36	45
Cutoff & Sawing Machines	86	169,107	5	7.7	17	28	33	22
Non-NC Bending & Forming	41	77,285	2	3.5	11	19	38	32
Non-NC Punching & Shearing	41	66,363	9	3.0	11	20	37	32
Hydraulic Presses	38	53,292	−5	2.4	14	22	34	30
Honing, Lapping, Polishing	33	50,626	NA	2.3	12	23	35	30
Non-NC Boring Machines	28	40,462	−17	1.8	8	11	34	47
Gear-cutting & -finishing	10	34,834	−11	1.6	7	11	32	50
NC Turning Machines	26	33,352	236	1.5	58	28	11	3
Tapping Machines	24	28,139	1	1.3	13	25	36	26
Machining Centers	19	24,003	26	1.1	58	26	15	1
Forging Machines	6	19,613	−4	0.9	6	11	30	54
Pneumatic Presses	8	17,656	NA	0.8	18	30	37	16
Broaching Machines	18	16,505	20	0.8	11	15	29	45
NC Milling Machines	16	15,929	209	0.7	44	27	22	6
Station-Type Machines	5	13,588	−25	0.6	16	20	32	31
Electrical-Machining Units	14	12,434	9	0.6	31	28	35	6
Other Non-NC Metal Cutting	4	12,075	NA	0.6	12	18	37	34
Threading Machines	13	11,703	−5	0.5	8	17	37	38
Other Non-NC Metalforming	3	11,255	−67	0.5	6	18	36	40
Coil-Processing Systems	6	10,852	−78	0.5	13	25	35	27
Thread-Rolling Machines	5	8,604	36	0.4	9	17	31	43
Diecasting Machines	2	8,095	−21	0.4	12	24	44	20
NC Drilling Machines	9	7,993	134	0.4	21	29	43	8
Multiple-Side Forming Mach.	2	7,003	−45	0.3	7	21	35	38
NC Punching & Shearing	8	6,223	277	0.3	37	29	26	8
Non-NC Thermal Cutting	8	5,302	−61	0.2	28	33	26	14
NC Boring Machines	7	5,064	68	0.2	29	22	33	17
Other NC Metalcutting	2	3,121	652	0.1	19	25	13	43
NC Bending & Forming	3	2,585	21	0.1	33	26	27	15
NC Grinding Machines	3	2,276	734	0.1	50	21	22	7
Sheet-, Plate-processing	2	1,634	NA	0.1	15	25	24	37
NC Thermal Cutting	3	1,034	NA	0.1	53	29	8	9
Other NC Metalforming	(a)	488	75	(b)	47	18	22	14

NA - Not Available.

(a) Percentage is less than 1%.
(b) Percentage is less than 0.1%.

Source: American Machinist, "13th Inventory of Metalworking Equipment, 1983."

NUMERICALLY CONTROLLED MACHINE TOOLS IN USE IN METALWORKING INDUSTRIES

Number by Type of Machine and User Industry, 1983

Using Industry	Metal Cutting						Metal Forming Total
	Total	Turn	Bore	Drill	Mill	Machining Centers	
TOTAL	94,012	33,352	5,064	7,993	15,929	24,003	9,296
Metal Furniture and Fixtures	253	46	19	58	43	23	357
Primary Metals Industries	2,413	842	271	261	433	353	249
Fabricated Metal Products	10,841	4,348	500	1,121	1,676	1,652	3,622
Ordnance and Accessories	797	NA	NA	NA	NA	NA	16
Non-Electrical Machinery	50,698	18,592	2,935	4,205	7,876	13,917	1,843
Metalworking Machinery	11,713	2,716	858	1,136	2,410	3,005	85
Machine Tools	3,373	956	355	400	355	1,103	31
Special Industry Machinery	3,903	1,115	219	559	563	1,314	134
Electrical Machinery and Equipment	9,415	2,677	182	1,150	1,983	2,644	1,357
Transportation Equipment	14,397	4,922	907	718	2,145	4,127	887
Aircraft Engines and Parts	8,450	2,790	426	336	1,692	2,810	332
Precision Instruments	4,434	1,538	110	227	1,132	1,240	440
Miscellaneous Manufacturing Industries	1,561	387	140	253	641	47	541

NA - Not Available.

Source: American Machinist, "13th Inventory of Metalworking Equipment, 1983."

Technical Publications

NMTBA offers a series of ten technical publications that contain suggestions, guidelines and information to make your company's operation more efficient and productive.

1 Guidelines for the Measurement of Machine Tool Utilization
This publication suggests a uniform procedure for the measurement and reporting of machine tool utilization. It provides a system to measure the effectiveness of a wide variety of machines and their related resources. It establishes indices of production, availability, utilization and consistent methods for their evaluation.

2 Noise Measurement Techniques
This publication suggests the most recent measuring techniques and procedures for the determination of machine tool sound. A discussion of time-weighted average sound levels is included, as well as a discussion of the disagreement between OSHA and EPA as to the basis for computing noise dosage.

3 Definition and Evaluation of Accuracy and Repeatability of NC Machine Tools
This publication was prepared to help develop a better understanding of the accuracy and repeatability of numerically controlled machine tools. Definitions, methods of computation and testing procedures are thoroughly discussed. This paper is recognized in the COCOM (Coordinating Committee) Regulations which govern the export licensing of NC machine tools.

4 Common Words As They Relate to NC Software
The aim of this publication is to improve communication among those involved with NC computer software. It defines the common terms used throughout the industry including those regarding the preparation and use of computer software for numerically controlled machine tools.

5 NC Character Code Cross Reference Chart
The process of generating tapes for NC machine tools involves the use of a number of media, as well as various character codes. This publication provides a convenient cross reference, correlating the codes and standards to present the needed information in a single document.

6 Machine Tool Standards Index
A bibliography of standards pertinent to the design, manufacture, sale and use of machine tools.

7 Selecting an Appropriate NC Programming Method
Selecting the best NC programming method for a particular set of manufacturing circumstances is an important decision for new and established NC shops alike. The implications of this decision are manifold and an incorrect decision can adversely affect the expected return on high cost capital equipment. This publication explains the elements of manual and computer-aided programming and will help you in selecting the right method for your shop.

8 NC is EZ
This publication is intended as a practical and easy to understand NC primer. It will help prospective first-time NC users plan and execute the installation and start-up of new equipment with a minimum of difficulty.

9 NC Part Programming Profile and Summary Report
This survey and summary report provides data useful to companies to compare their own NC programming efforts with other shops having a similar number of NC machines. It puts in proper perspective the NC programming effort required at shops considering acquisitions—perhaps first-time—of machine tools.

10 Bibliography of Numerical Control Standards and Related Publications
This listing of Numerical Control (NC) standards and related publications offers information on the availability, scope, purpose and source of each. This document can be of considerable value to both the manufacturer and the user of numerically controlled machine tools.

NMTBA
The Association For Manufacturing Technology

For prices and ordering information, contact the Publications Order Clerk,
NMTBA—The Association For Manufacturing Technology, 7901 Westpark Drive, McLean, Virginia 22102-4269
Telephone: 703/827-5261

Abbreviations

and

Explanation of Terms

ABBREVIATIONS

ADR — The Asset Depreciation Range System

BEA — Bureau of Economic Analysis

BLS — Bureau of Labor Statistics

BTN — Brussels Tariff Nomenclature

CCC — Customs Co-Operation Council

CECIMO — Comité Européen de Coopération des Industries de la Machine Outil

C.I.F. — Cost, Insurance and Freight. Under these terms, the seller quotes a price which includes the cost of the goods, marine insurance and the transportation charges to a specified point of destination.

D — Withheld to avoid disclosing figures for individual companies

E — Estimate

EEC — European Economic Community

F.A.S. — Free Alongside Ship. Prices specified under these export terms provide that the seller delivers the goods to be exported alongside the overseas vessel within reach of its loading equipment.

F.O.B. — Free on Board. Seller is required to place goods aboard the equipment of the transporting carrier without cost to the buyer. The term F.O.B. must be qualified by a name destination.

FTC — Federal Trade Commission

GNP — Gross National Product

ILO — International Labor Organization

ITC — International Trade Commission

NA — Not Available

NC — Numerically Controlled

NEC — Not Elsewhere Classified

NMTBA — National Machine Tool Builders' Association

P — Preliminary

R — Revised

S — Estimate did not meet Publication Standards

SEC — Securities and Exchange Commission

S.I.C. — Standard Industrial Classification

SITC — Standard International Trade Classification of the United Nations

TSUSA — Tariff Schedules of the U.S., Annotated

U.N. — United Nations

VDMA — Verein Deutscher Maschinenbauanstalten

VDW — Fachgemeinschaft Werkzeugmaschinen in VDMA

Z — Figure below the Minimum Unit of Measure Selected

EXPLANATION OF TERMS

ACCESSIONS

........See LABOR TURNOVER

AIRCRAFT, MISSILES AND PARTS

........Industry Group, conforming to the Standard Industrial Classification. Consists of Industry Group, SIC 372, Aircraft and Parts, and SIC 376, Establishments Primarily Engaged in Manufacturing Complete Guided Missiles and Space Vehicles and Parts.

ASSETS, NET

........Total net assets are the sum of all recorded assets after reducing such amount by allowance or reserve for bad debts, depreciation and amortization, but before deducting any liabilities, mortgages or other indebtedness.

AVERAGE HOURLY EARNINGS

........See EARNINGS

AVERAGE STRAIGHT-TIME HOURLY EARNINGS

........See EARNINGS

AVERAGE WEEKLY HOURS

........See HOURS, AVERAGE WEEKLY

AVERAGE WEEKLY EARNINGS

........See EARNINGS

BACKLOG

........See ORDERS, UNFILLED

CANCELLATIONS

........Gross new orders less cancellations equal net new orders in the order data of NMTBA. Cancellation provisions are usually specified in purchase orders.

CAPACITY UTILIZATION

........There are seven different series on capacity utilization. The most widely used are the indexes published by the Federal Reserve Board, the U.S. Department of Commerce's Bureau of Economic Analysis and McGraw-Hill Publications. Though their statistical methodology varies, each of these indexes attempts to present a measure of current physical industrial output levels as they compare to the potential level of output if all available productive facilities were in full use. Some series measure utilization according to absolute output potential while others measure utilization relative to that portion of absolute capacity which management prefers. While these differences lead to divergent index numbers, quite often the relative changes of the different indexes parallel each other.

CAPITAL EXPENDITURES

........See PLANT AND EQUIPMENT

CAPITAL GOOD INDUSTRIES

........This category is defined as the Nonelectrical Machinery industry, exclusive of farm machinery and equipment producers and machinery shops, the Electrical Machinery Industry, exclusive of household appliances and electronic components manufacturers, and the non-defense portion of the following industries: Shipbuilding and Repairing, Railroad Equipment, Communication Equipment, Aircraft and Parts, and Ordnance plus Defense Products.

COMPENSATION

........See EARNINGS; PAYROLL

COMPENSATION, SUPPLEMENTARY

........Supplementary compensation statistics fall into two broad categories and are intended to capture payroll expenditures made by employers which are in addition to the stated hourly wage rate. These categories are:

1. Payments to Workers—which includes payments for paid leave time, premiums for overtime, weekend, holiday, and shift work; non-production bonuses (e.g., Christmas); and terminal payments.
2. Expenditures in Addition to Payroll—which encompass expenditures for which the employer irrevocably makes a payment under the provisions of a legally required insurance program or private welfare plan; e.g., social security, unemployment compensation and other insurance for the benefit of the workers; life, accident, and health insurance; pension and retirement plans; vacation and holiday funds; severance and supplemental unemployment benefit plans; and savings and thrift plans.

For further explanation, see the "BLS Handbook of Methods, U.S. Bureau of Labor Statistics, Bulletin 1910."

CONSTANT DOLLARS

........Constant dollar estimates represent an effort to remove the effects of price changes from statistical series. In general, they are arrived at by dividing current dollar estimates by appropriate price indexes.

Any changes in such a series would reflect only changes in the "real" (physical) volume of output.

........See IMPLICIT PRICE DEFLATOR.

CONSUMER PRICE INDEX

........See PRICE INDEX

CONSUMPTION

........The term consumption, as used in this publication, refers to the domestic production, less exports, plus imports of a particular commodity.

CONTROLS

........See NUMERICAL CONTROLS

CORPORATE CAPITAL CONSUMPTION ALLOWANCES

........Accounting charges which reflect estimates of wear and tear, obsolescence, destruction, and accidental losses of physical capital.

Gross National Product less capital consumption allowances is referred to as Net National Product.

COST OF MATERIALS

........See MATERIALS, COST OF

DEFENSE PRODUCTS

........The "defense products" category for manufacturers' shipments, orders, and inventories consists of communication equipment, complete aircraft and parts, shipbuilding and military tank vehicles and ordnance. See Census Bureau, Current Industrial Report, Series: M3-1 and MA-175 Shipments of Defense-oriented Industries.

DEPRECIATION

........Depreciation is the general conversion of the depreciable cost of a fixed asset into expense, spread over its remaining life. There are numerous depreciation methods, all based on a periodic charge to an expense account and a corresponding credit to a depreciation reserve.

Plant (Structure and Additions) depreciation and amortization are usually reported separately from machinery and equipment depreciation.

DIFFERENTIAL (SHIFT)

........Shift differentials represent premium payments for work on late or night shifts. They are part of Supplementary Compensation (See COMPENSATION, SUPPLEMENTARY) paid to workers.

DOMESTIC (ORDERS, SHIPMENTS, UNFILLED ORDERS, CANCELLATIONS)

........Totals are the sum of "domestic" and "foreign." "Domestic" represents business activity originating within or destined for the United States, its territories and possessions.

DURABLE GOODS

........An item, destined for either producers or consumers, that in normal use is likely to last longer than three years. Consumer durable goods include automobiles, appliances, jewelry and books. Producer durable goods include a wide range of machinery and equipment.

DURABLE GOODS INDUSTRIES

........Comprise manufacturing major industry groups with SIC Codes 24, 25, and 32 through 38. All other manufacturing major industry groups in SIC Codes 20 through 38 are considered as nondurable goods manufacturing industry groups.

EARNINGS

........Earnings are the actual return to the worker for a stated period of time. Irregular bonuses, retroactive items, payments of various welfare benefits, payroll taxes paid by employers are excluded.

..........AVERAGE HOURLY EARNINGS

........are on a "gross" basis, reflecting not only changes in basic hourly and incentive wage rates, but also such variable factors as premium pay for overtime and late shift work, and changes in output of workers paid on an incentive plan.

..........AVERAGE STRAIGHT-TIME HOURLY EARNINGS

........exclude premium payments for overtime and for work on weekends, holidays, and late shifts. Regular day-shift wages or salaries paid per hour worked during a standard workweek are included; incentive pay, production bonuses, and cost of living payments are included in these statistics, Non-production bonuses are excluded.

.........AVERAGE WEEKLY EARNINGS

........are derived by multiplying average weekly hours by hourly earnings.

ELECTRICAL MACHINERY INDUSTRY

........Major Group 36, Electrical Machinery, Equipment and Supplies, according to the Standard Industrial Classification, comprises SIC Industry Groups:

..........361. Electrical Transmission and Distribution Equipment
362. Electrical Industrial Apparatus
363. Household Appliances
364. Electrical Lighting and Wiring Equipment
365. Radio and Television Receiving Sets
366. Communication Equipment
367. Electronic Components and Accessories
369. Miscellaneous Electrical Machinery, Equipment and Supplies

EQUITY

........See STOCKHOLDER'S EQUITY

ESTABLISHMENT

........The "establishment" is the basis for reporting to the Census of Manufactures. It is an operating facility in a single location. Where one facility engages in different lines of activity, it is required to submit separate reports, provided that plant records permit such a separation and the activities are substantial in size.

EXCHANGE RATES

........An exchange rate is nothing more than the purchase price of a unit of one nation's currency expressed in terms of another nation's currency. The exchange rates cited in this text are the market rates published by the International Monetary Fund.

EXPENDITURES ON NEW PLANT AND EQUIPMENT

........See PLANT AND EQUIPMENT

EXPORTS

........EXPORTS OF DOMESTIC MERCHANDISE—TOTAL

.........Data are compiled from copies of Shippers' Export Declarations filed with U.S. Customs officials. Export values are those declared by the shipper at the time of exportation. Values of containers and coverings are included. Freight, insurance and other changes to the point of export are included, but freight and other charges from the place of departure in the United States to the destination in the foreign country are not.

A description of the procedures used for compiling these statistics appears in Report FT 410, United States Exports, Commodity by Country, published by the U.S. Bureau of the Census.

MANUFACTURERS' EXPORT SHIPMENTS

........These data are based on manufacturers' factory shipments for exports. For machine tools the value figures represent the manufacturers' selling price, F.O.B. factory, of complete machines as shipped, including all accessories, attachments, and numerical controls that are ordered and shipped with the machines. Rebuilt machinery, machine tools designed for use in home workshops, laboratories, garages, service shops, or for modelmaking are excluded.

FROM FOREIGN COUNTRIES

........Export statistics supplied by the United Nations and foreign countries are defined by the originating agency and may not be comparable to U.S. definitions.

........The International Trade Statistics Center, Statistical Office of the United Nations prepares some special data on the U.S. share of exports from fourteen supplier countries to the world and to 90 countries of destination. The definition of machine tools for this series is the Standard International Trade Classification, Revised (SITC) of the United Nations, SITC NO. 715.1, Machine Tools for Working Metals. (See MARKET SHARE).

Exports are value F.O.B. port of shipment by all reporting countries, except Canada which values exports F.O.B. inland point of shipment and the United States which values exports F.A.S.

U.S. and U.K. data refer to exports of domestic merchandise; data for Denmark, Japan, Norway and Sweden are for exports including re-exports; Canadian data are for general exports.

The table on "Machine Tool Exports from 14 Supplier Countries to the U.S." appearing in this text is based on the U.N. figures.

The special tables on German, British, Italian and Japanese foreign trade data are based on statistics prepared in those countries.

NOTE:

The definition of "Exports of Domestic Merchandise—Total" is broader than the definition of "Manufacturers' Export Shipments." Exports in the first category should, therefore, be larger than those in the second category. While this generally is the case, it is not always the case. In certain classifications, manufacturers' export shipments in some years exceed total exports of domestic merchandise. The reasons for this may lie in differences in the time of reporting, difference in classifying certain machine tools, and, possibly, in errors of classification on Shippers Export Declarations.

Differences will also be noted between U.S. exports to a foreign country and the imports from the U.S. reported by that country for the same year. The reverse also occurs—U.S. imports from a given country may differ from the exports to the U.S. reported for the same year by that country.

This may be due to differences in the time the exports and imports were reported, differences in determining values, differences in the classification of commodities, differences in conversion of currencies, and errors in classification or computation.

FABRICATED METAL PRODUCTS INDUSTRY

........The Production Indexes published in this book appear as compiled by the Board of Governors of the Federal Reserve System.

........See INDUSTRIAL PRODUCTION

........in all other tables consists of SIC Major Group 34, Fabricated Metal Products except Machinery and Transportation Equipment. The SIC Industry Groups included are:

........341. Metal Cans
342. Cutlery, Hand Tools, and General Hardware
343. Heating Equipment (except electrical) and Plumbing Fixtures
344. Fabricated Structural Metal Products
345. Screw Machine Products, and Bolts, Nuts, Screws, Rivets and Washers
346. Metal Stampings
347. Coating, Engraving and Allied Services
348. Ordnance and Accessories
349. Miscellaneous Fabricated Metal Products.

FOREIGN (ORDERS, SHIPMENTS, UNFILLED ORDERS, CANCELLATIONS)

........"Totals" are the sum of "domestic" and "foreign." "Foreign" represents all business activity destined for other than the United States, its territories or possessions.

FOREIGN INVESTMENT, DIRECT U.S.

........Direct U.S. foreign investment consists of net capital outflows from the U.S. into businesses in which U.S. residents have significant control. Reinvested returns of the foreign investment are included in these data but portfolio holdings of foreign securities are excluded.

FOREIGN TRADE

........See EXPORTS; IMPORTS

FRINGE BENEFITS

........See COMPENSATION, SUPPLEMENTARY

FURNITURE AND FIXTURE INDUSTRY

........Major Group 25, Furniture and Fixtures, according to the Standard Industrial Classification, comprises SIC Industry Groups:

........251. Household Furniture
252. Office Furniture
253. Public Buildings and Related Furniture
254. Partitions, Shelving, Lockers, and Office and Store Fixtures
259. Miscellaneous Furniture and Fixtures.

GNP—GROSS NATIONAL PRODUCT

........Gross National Product or expenditure is the market value of the output of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for business and institutional consumption of durable goods.

Gross national product comprises the purchase of goods and services by consumers and government, gross private domestic investment, and net exports. Beginning with 1960, the estimates include data for Alaska and Hawaii.

GROSS NEW ORDERS

........SEE ORDERS

GROSS PRIVATE DOMESTIC INVESTMENT

........Consists of fixed investment and change in business inventories. Fixed investment measures additions to, and replacements of, private capital brought about through net acquisitions by businesses and non-profit institutions of durable equipment and structures for business and residential purposes.

HEALTH, INSURANCE AND RETIREMENT PLANS

........See COMPENSATION, SUPPLEMENTARY

HOLIDAYS, PAID

........See COMPENSATION, SUPPLEMENTARY

HOURS, AVERAGE WEEKLY

........These statistics are derived by dividing the total of all hours worked in a reporting establishment or industry, including overtime, by the number of employees who received remuneration for their work. Such data differs from standard or scheduled hours.

HOURS, OVERTIME

........Overtime hours represent that portion of the gross average weekly hours which were in excess of regular hours and for which premium payments were made.

Overtime hours are premium hours by definition.

HOURS, SCHEDULED, WEEKLY

........Refers to the predominant work schedule for full-time production workers employed on the day shift.

IMPLICIT PRICE DEFLATOR

........The implicit price deflator is the price index for gross national product. It is a weighted average of the price indexes used to deflate the components of GNP. The implicit weights used are expenditures in the current period. The implicit price index is generally regarded as the best single measure of broad price movement in the economy as a whole.

IMPORTS

........Imports are classified as "general imports" or "imports for consumption." In this volume, we generally speak of "imports for consumption." These are entries for immediate consumption plus merchandise withdrawn from bonded storage warehouses for consumption.

IMPORTS INTO THE UNITED STATES

........Data are compiled from Import Entries filed with U.S. Customs officials. Import values are in general based on the market value or price in the foreign country at the time of exportation of such merchandise. These values include the cost of containers and coverings, as well as other charges and expenses incidental to placing the merchandise in condition, packed ready for shipment to the United States, but exclude import duties, insurance, ocean freight and other charges incidental to arrival of the goods in the United States. The foreign values of imported merchandise are converted into U.S. currency at the rate of exchange prevailing on the day the merchandise is shipped to the United States (but the same rate of exchange may be used for each currency for a 3-month period so long as the rate on any particular day did not vary from it by 5 percent or more).

........Machine tool import data includes used and rebuilt machine tools, replacement parts and home workshop tools. Also included may be some metalworking machinery other than machine tools.

Because the SIC and the statistical export and import classifications were developed independently, there are considerable difficulties in meshing the three systems. Many adjustments are required for comparability. The Census Bureau has published several imports in which comparability is attempted. Among these are annual volumes on U.S. Commodity Exports as Related to Output, U.S. Imports for Consumption and General Imports, SIC-Based Product Classification, by Area, FT 210, and U.S. Exports of Domestic Merchandise, SIC-Based Products and Area, FT 610.

A description of the procedures for compiling import statistics appears in Report FT 135, U. S. Imports, General and Consumption, Schedule A, Commodity and Country, published by the U.S. Bureau of the Census.

IMPORTS INTO FOREIGN COUNTRIES

........The separate tables on German, British, Italian, and Japanese foreign trade data are based on statistics prepared in those countries.

NOTE:

Differences will be noted between U.S. imports from a foreign country and the exports to the U.S. from that country for the same year. The reverse also occurs—U.S. exports to a given country may differ from the imports from the U.S. reported by that country for the same year. These differences may be due to differences in the time the imports and exports were reported, differences in determining values, differences in classification of commodities, differences in the conversion of currencies, and errors in classification or computation.

INCOME

........NET OPERATING INCOME.

........is total net sales less total operating costs.

NET INCOME (Before Income Taxes).

........is Net Operating Income plus or minus "Other Income and Expense."

OTHER INCOME AND EXPENSE.

........includes interest, income, royalty income, capital gains and losses, interest expense, cash discounts, etc.

NET INCOME (After Income Taxes).

........equals Net Income (Before Income Taxes) less all income taxes.

INDUSTRIAL PRODUCTION, TOTAL

........A measure of the physical output of U.S. manufacturing, mining, and utility industries compiled monthly by the Board of Governors of the Federal Reserve System. Covering about 35% of the total U.S. output of goods and services, the index includes a representative group of products, ranging from pig iron and cotton yarn to machine tools and electricity. It excludes agriculture, construction, and service industries. The relative importance assigned to individual products is based on quantity and value data determined from recent government censuses. Manufacturing accounts for 88.55% of the index, mineral production for 6.37%, and utilities for 5.08%. Current output is expressed as a percentage of annual production levels during 1967.

INSTRUMENTS AND RELATED PRODUCTS

........Major Group 38. Measuring, Analyzing and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks, according to the Standard Industrial Classification, comprises SIC Industry Groups.

........381. Engineering, Laboratory, Scientific and Research Instruments and Associated Equipment
382. Measuring and Controlling Instruments
383. Optical Instruments and Lenses
384. Surgical, Medical, and Dental Instruments and Supplies
385. Ophthalmic Goods
386. Photographic Equipment and Supplies
387. Watches, Clocks, Clockwork Operated Devices, and Parts

INVENTORIES

........End of month stocks of manufacturing establishments regardless of stage of fabrication. These inventories are valued at cost in the economic and statistical indicators, but are valued at current prices in the National Income and Product Accounts (which measure change in business inventories).

LABOR TURNOVER

........Labor turnover is the gross movement of wage and salary workers into and out of employed status with respect to individual establishments. This movement, which relates to a calendar month, is divided into two broad types: accessions (new hires and rehires) and separations (terminations of employment initiated by either employer or employee). Data for each type of action is accumulated for a calendar month and expressed as a rate per 100 employees. The data relate to all employees, whether full- or part-time, permanent or temporary, including executive, office, sales, other salaried personnel and production workers.

ACCESSIONS

........are the total number of permanent and temporary additions to the employment roll including both new and rehired employees.

NEW HIRES

........are temporary or permanent additions to the employment roll of persons who have never before been employed in the establishment.

OTHER ACCESSIONS

........which are not published separately but are included in total accessions, are all additions to the employment roll which are not classified as new hires.

SEPARATIONS

........are terminations of employment during the calendar month and are classified according to cause, quits, layoffs, and other separations, as defined below.

........QUITS

....are terminations of employment initiated by employees, failure to report after being hired, and unauthorized absences.

LAYOFFS

....are suspensions without pay lasting or expected to last more than 7 consecutive calendar days, initiated by the employer without prejudice to the worker.

OTHER SEPARATIONS

....are terminations of employment because of discharge, permanent disability, death, retirement, etc.

LAYOFFS

........See LABOR TURNOVER.

LEADING INDICATORS

........A set of economic time series, each of which usually reaches business cycle peaks and troughs ahead of general economic activity. While there are forty distinctly recognized leading indicators, only 12 are included in the widely publicized "Composite Index of Leading Indicators".

MACHINE TOOL INDUSTRY

........The machine tool industry covers establishments primarily engaged in producing metal cutting type machine tools and metal forming type machine tools. The U.S. Bureau of the Census has assigned industry SIC codes 3541 and 3542 to these industries.

An establishment is primarily engaged in the machine tool industry if the value of machine tools produced exceeds in value the production of products of other industries.

Because many establishments classified as being within the machine tool industry produce not only machine tools (their "primary products") but also other products (their "secondary products"), the "machine tool industry" figures do not measure machine tool activities only. In 1972, for instance, only 86 per cent of the value of shipments of the "metal cutting machine tool industry" consisted of metal cutting machine tools. The most important other products shipped were machine tool accessories and measuring devices.

While not all the shipments of the machine tool industry were made up of machine tools, some other industries did produce machine tools as their "secondary products." The 1972 Census of Manufactures showed that 90 per cent of all metal cutting machine tools were produced by the "metal cutting machine tool industry." The remaining 10 per cent were shipped by other industries. The "machine tool industry" statistics are important because they permit a measurement of the economic status of the plants which make machine tools their major business—their location, employment, payroll, etc. They are less reliable if we want to measure total machine tool production and shipments. To get the facts on total machine tool production, we should look at "Shipments"—see separate entry.

MACHINE TOOL PRODUCTS
........See SHIPMENTS

MACHINE TOOL SHIPMENTS
........See SHIPMENTS

MACHINE TOOLS, COMPLETE
........Machine tools (See MACHINE TOOLS, DEFINITION) as shipped, including all accessories, attachments, and numerical controls that are ordered and shipped with the machines.

MACHINE TOOLS, DEFINITION
........Machine tools are either metal cutting machines or metal forming machines.

METAL CUTTING TYPES
........of machine tools are power driven machines, not supported in the hands of an operator when in use, that shape metal by cutting or use of electrical techniques. Machine tools of the metal cutting type are classified under SIC product codes, the first four digits of which are 3541.

METAL FORMING TYPES
........of machine tools are power driven machines, not supported in the hands of an operator while in use, for pressing, forging, hammering, extruding, shearing, bending or die casting metal into shape. Machine tools of the metal forming type are classified under SIC product codes, the first four digits of which are 3542.

MACHINERY, EXCEPT ELECTRICAL
........See NONELECTRICAL MACHINERY

MACHINERY AND EQUIPMENT INDUSTRIES
........are classified as a supplementary market category for manufacturers' orders, inventories and shipments. The other categories are "consumer durables" and "defense products." (See separate item—DEFENSE.)

........MACHINERY AND EQUIPMENT INDUSTRIES CATEGORY, consists of,
....nonelectrical machinery
....See NONELECTRICAL MACHINERY, but excluding farm machinery and machine shops; electrical machinery
....See ELECTRICAL MACHINERY, but excluding household appliances, communication equipment and electronic components; shipbuilding and repairing; and railroad and streetcar equipment.

MAJOR USERS—MAJOR USER CATEGORIES
........The major users of machine tools are the nonelectrical machinery industry, the fabricated metal products industry, the electrical machinery and equipment industry and other industry groups (see individual industry groups) listed in the inventory section of this volume.

MAN-HOURS
........All plant man-hours of production and related workers. Represents all man-hours worked or paid

for including actual overtime hours. Excludes hours paid for vacation, holidays or sick leave when the employee was not at the plant.

MANUFACTURERS' EXPORT SHIPMENTS
........See EXPORTS

MANUFACTURERS' NEW ORDERS
........See ORDERS

MANUFACTURERS' SHIPMENTS
........See SHIPMENTS

MARKET CATEGORY
........Major User Categories are classified either by Industry Group or by Market Category.
........See MAJOR USERS, DEFENSE, and MACHINERY AND EOUIPMENT INDUSTRIES

MARKET SHARE:
........Market Share defines what portion of a country's total imports of a specific commodity are attributable to a specific country of origin. The table in Chapter 6 of this text details this data for machine tool exports from the major Western industrial nations.

MATERIALS, COST OF
........"Cost" is defined as the direct charges actually paid or payable for items consumed or put into production during one year, after discounts, and including freight charges and other direct charges incurred by the establishment in acquiring the materials.

........Cost of materials includes:
- ....the total delivered cost of all raw materials, semi-finished goods, parts, components, containers, scrap, and supplies consumed or put into production during the year:
- ....the amount paid for electric energy purchased;
- ....the amount paid for all fuels consumed for heat, power, or the generation of electricity;
- ....the cost of work done by others on materials or parts furnished by manufacturing establishments (contract work);
- ....the cost of products bought and resold in the same condition.
  - ....cost of materials excludes the cost of services used, such as,
  - ....advertising, insurance, telephone, etc.;
- ....research development, and consulting services;
- ....overhead costs, such as depreciation charges, rent, interest, royalties, etc.;
- ....expense items chargeable to fixed asset accounts.

METAL FORMING
........See MACHINE TOOLS

METAL CUTTING
........See MACHINE TOOLS

METALWORKING INDUSTRY
........Industry Group 354, Metalworking Machinery and Equipment according to the Standard Industrial Classification. This industry group comprises the following industries,

........3541. Machine Tools, Metal Cutting Types
3542. Machine Tools, Metal Forming Types
3544. Special Dies and Tools, Die Sets, Jigs and Fixtures
3545. Machine Tool Accessories and Measuring Devices
3546. Power Driven Hand Tools
3547. Rolling Mill Machinery and Equipment
3549. Metalworking Machinery, N.E.C.

MOTOR VEHICLES AND PARTS INDUSTRY
........Industry Group 371. Motor Vehicles and Motor Vehicle Equipment, according to the Standard Industrial Classification, comprises the following industries.

3711. Motor Vehicles
3712. Passenger Car Bodies
3713. Truck and Bus Bodies
3714. Motor Vehicle Parts and Accessories
3715. Truck Trailers (Full)

NC
........See NUMERICAL CONTROLS

NET ASSETS
........See ASSETS, NET

NET INCOME
........See INCOME

NET NEW ORDERS
........See ORDERS

NET OPERATING PROFIT
........See INCOME

NET PROFIT ON SALES
........See INCOME

NET SALES
........See SALES

NEW HIRES
........See LABOR TURNOVER

NONELECTRICAL MACHINERY INDUSTRY
........Major Group 35, Machinery, except Electrical, according to the Standard Industrial Classification, comprises,

........351. Engines and Turbines
352. Farm Machinery and Equipment
353. Construction, Mining, and Materials Handling Machinery and Equipment
354. Metalworking Machinery and Equipment
355. Special Industry Machinery, Except Metalworking Machinery
356. General Industrial Machinery and Equipment
357. Office, Computing, and Accounting Machines
358. Refrigeration and Service Industry Machinery
359. Miscellaneous Machinery, Except Electrical

NUMERICAL CONTROLS
........Machine tool control systems which operate a machine by means of numerically coded programs inserted or fed into the systems on tape, punched cards, dials, plugs, preset switches or by playback of prerecorded operating programs.

OPERATING PROFIT
........See INCOME, NET OPERATING

ORDERS
........CENSUS SERIES ON SHIPMENTS, INVENTORIES AND ORDERS

........NEW ORDERS, NET,

....represent gross new orders net of cancellations received during the period. The series of new orders is adjusted for the number of trading days and length of calendar month prior to seasonal adjustment.

UNFILLED ORDERS

....at the end of a reporting period are orders that have not passed through the sales account and are equal to unfilled orders at the beginning of the period plus net new orders received during the period less net sales. Estimates for unfilled orders are obtained for each detailed category by multiplying the estimate for the preceding month by the link relatives based on a matched sample of reporting companies. The data for each company are inflated by their sampling weights before being summarized.

........NMTBA SERIES ON NEW ORDERS AND SHIPMENTS

........GROSS NEW ORDERS, minus CANCELLATIONS, equal NET NEW ORDERS

....The data are collected from participating companies and expanded to industry totals. The totals are adjusted periodically to benchmarks provided by the MQ-35W (See separate entry—SHIPMENTS—COMPLETE MACHINE TOOLS—MQ-35W) for metal cutting and metal forming.

NMTBA data include only complete new machine tools and the accessories, attachments and tools ordered with them. They include only orders for machines to be built and assembled in the United States.

UNFILLED ORDERS

....Unfilled orders at the end of the reporting month are unfilled orders at the first of the month, plus new orders, less cancellations and less shipments. Any adjustments (due to corrections, price changes, etc.) are made through adjustments in cancellations, shipments or orders.

ORDNANCE AND ACCESSORIES, EXCEPT VEHICLES AND GUIDED MISSILES

........Major Group 348, Ordnance and Accessories, Except Vehicles and Guided Missiles, according to the Standard Industrial Classification, comprises Industry Groups

........3482. Small Arms Ammunition
3483. Ammunition, Except for Small Arms, not Elsewhere Classified
3484. Small Arms
3489. Ordnance and Accessories, Not Elsewhere Classified

OVERTIME

........See HOURS, OVERTIME

PAYROLL

........Includes the gross earnings paid in the calendar year to all employees on the payroll of operating manufacturing establishments.

Includes all forms of compensation directly to workers such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds.

Does not include employers' Social Security contributions or other non-payroll labor costs such as employees' pension plans, group insurance premiums, and workmen's compensation.

PLANT AND EQUIPMENT, EXPENDITURES FOR NEW

........New plant and equipment expenditures refer to all costs (both replacement and expansion) chargeable to fixed asset accounts and for which depreciation accounts (see DEPRECIATION) are ordinarily maintained. Included in the totals are expenditures for new construction, machinery, and new equipment (automobiles, trucks, and other transportation equipment, furniture and fixtures, office machinery and all other new equipment). The figures do not include expenditures for land and mineral rights, maintenance and repair, used plant and equipment, and expenditures made in foreign countries.

PRECISION INSTRUMENTS

........This classification, used in the American Machinist 12th Inventory, is not listed in the Standard Industrial Classification. The closest category is SIC Major Group 38.

........See INSTRUMENTS AND RELATED PRODUCTS

PRICE INDEX ....

The CONSUMER PRICE INDEX measures the effect of price change on the living costs of all urban consumers. It is calculated by comparing, from one period to the next, the cost of a "market basket" of goods and services usually purchased by this particular population group. For more detail, see "The Consumer Price Index, A Short Description of the Index as Revised", U.S. Bureau of Labor Statistics.

The PRODUCER PRICE INDEX is designed to show the general rate and direction of the composite of price movements in primary markets. It is designed to measure "real" price changes between two periods of time, i.e. to measure price changes not influenced by changes in quality, quantity, terms of sale, level of distribution, unit prices or source of price. For a more detailed description, see U.S. Bureau of Labor Statistics Bulletin 1910, "BLS Handbook of Methods".

PRIMARY PRODUCTS

........The products of an establishment which exceed in value its production of products of any other single industry.

PRODUCERS' DURABLE EQUIPMENT

........Includes the new and replacement purchase of various types of machinery, automobiles, trucks and other equipment used by the private sector in the production of goods and services.

PRODUCTION WORKERS

........Production and related workers include working foremen and all non-supervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, janitorial and watchman services, product development, auxiliary production for plant's own use, and record keeping and services closely associated with the above production operations.

PRODUCTIVITY

........The total output index divided by the labor input index, The labor input index is the index of hours worked by all persons (formerly called man-hours).

PROFITS

........See INCOME

REAL GNP

........U.S. real GNP data are arrived at by dividing components of the seasonally adjusted current-dollars Gross National Product by appropriate price indexes. About 142 product groups are deflated separately each quarter. The quarterly results are adjusted to the annual constant-dollar figures which are prepared in greater detail.

QUITS

........See LABOR TURNOVER

SALES, NET, TOTAL

........Net Sales are the dollar value of machine tool shipments less returns and allowances, including dealers' commissions, if any.

SALES

........are net of returns, allowances, and discounts.

SCHEDULED WEEKLY HOURS

........See HOURS, SCHEDULED, WEEKLY

SECONDARY PRODUCTS

........Products which do not account for the highest proportion of the total shipments of an establishment and are "primary" to another industry.

SEASONALLY ADJUSTED

........Allowances have been made for recurrent seasonal movements. Dividing actual data by seasonal indexes provides seasonally adjusted data.

SEPARATIONS

........See LABOR TURNOVER

SEVERITY OF WORK INJURIES

........See WORK INJURIES

SHIFT DIFFERENTIAL

........Premium paid above straight-time rates for late or night shift.

SHIPMENTS—TOTAL CENSUS

........The U.S. Bureau of the Census publishes data on the value of all machine tool shipments and miscellaneous receipts. This includes the shipments and receipts of the machine tool industry proper (See separate entry—the Machine Tool Industry) as well as the machine tool shipments made by other industries.

Included in these shipments by product class and industry are not only the major classes of products such as boring machines, drilling machines, presses, etc., but also machine tools primarily designed for home workshops, laboratories, etc., parts sold separately, rebuilt machine tools and some tools not specified by kind. Also included are "miscellaneous receipts" of the machine tool industry for such items as contract and commission work, sales of products bought and resold, repair work, etc.

Every five years, the Census of Manufacturers collects these data in considerable detail by seven-digit product codes. More than one hundred metal cutting products and about 50 metal forming products are listed, many by quantity and value, in the Census of Manufacturers publication on Metalworking Machinery and Equipment for metal cutting and metal forming machine tools (SIC 3541 and 3542).

In years which are not Census years, an Annual Survey of Manufacturers is undertaken which permits compilation of product data for five-digit product classes. Data for non-Census years are estimates based upon reports received from a probability sample of all manufacturing establishments.

The Census of Manufacturers and Annual Survey data differ from the totals given by the Current Industrial Reports, MQ-35W, and from the NMTBA reports on shipments. The major differences are listed below.

........The Current Industrial Reports, MQ-35W (See separate entry—SHIPMENTS— COMPLETE MACHINE TOOLS—MQ-35W) differ from the Census of Manufactures and Annual Survey primarily because

........1) they do not include machine tools designed primarily for home workshops, garages, etc.,
2) they do not include parts and rebuilt or used machines.

The Current Industrial Reports, MQ-35W differ from NMTBA shipment reports (See separate item—SHIPMENTS—COMPLETE MACHINE TOOLS NMTBA) primarily because NMTBA reports only on shipments of complete machine tools valued at $2,500 or more.

SHIPMENTS—COMPLETE MACHINE TOOL-MQ-35W

........Data on shipments of complete machine tools are collected quarterly by the Bureau of Census jointly with the Business and Defense Services Administration.

The figures are published in the Current Industrial Reports, Series MQ-35W, Metalworking Machinery.

This report differs from the Census products reports in that it excludes

........1) parts and rebuilt or used machine tools;
2) machine tools primarily designed for home workshops, garages, etc.

........Shipments are shown by 5- and 7-digit SIC codes. The classification of products is being developed jointly by government agencies and industry.

The MQ-35W report also includes separate data on numerically controlled machines and on manufacturers' exports.

The value figures represent the manufacturers' selling price, F.O.B. factory, of complete machines as shipped, including all accessories, attachments and numerical controls that are ordered and shipped with the machines. Rebuilt machines, machine tools designed for use in home workshops, laboratories, garages, service shops, or for model making, imported machines, and power-driven hand tools are excluded.

SHIPMENTS—COMPLETE MACHINE TOOLS—NMTBA

........The National Machine Tool Builders' Association publishes a monthly report on orders and shipments for complete machine tools separated into metal cutting and metal forming and further subdivided into "domestic" and "foreign."

The data are collected from participating companies and expanded to industry totals. The totals are periodically adjusted to benchmarks provided by the MQ-35W (See separate entry—SHIPMENTS—COMPLETE MACHINE TOOLS—MQ-35W) for metal cutting and metal forming.

NMTBA data include new machine tools and the accessories, attachments and tools which are ordered and shipped with them. They cover machines built and assembled in the United States.

NMTBA data are published during the month following the report month.

SHIPMENTS—MAJOR USERS AND MAJOR USER CATEGORIES

........The term "shipments" as used in Series M3-1, Manufacturers' Shipments, Inventories, and Orders, U.S. Bureau of the Census, represents manufacturers' receipts, billings, or the value of products shipped, less discounts, returns, and allowances. Shipments for exports as well as those for domestic use are included.

The shipment estimates are adjusted annually to the benchmark levels from the Annual Survey of Manufacturers. (See also MAJOR USERS.)

STOCKHOLDERS' EQUITY

........Assets minus all obligations of the corporation, except those to stockholders. Annual data are average equity for the year (using four end-of-quarter figures). For details, see Federal Trade Commission—Securities and Exchange Commission, Quarterly Financial Report for Manufacturing Corporations.

STRAIGHT-TIME HOURLY EARNINGS

........See EARNINGS

STRUCTURE AND ADDITIONS
........See PLANT AND EQUIPMENT

SUPPLEMENTARY BENEFITS
........See COMPENSATION, SUPPLEMENTARY

TAXES
........See INCOME TAXES

TRANSPORTATION EQUIPMENT
........The Major Group SIC 37, Transportation Equipment, consists of SIC Groups.

........371. Motor Vehicles and Motor Vehicle Equipment
372. Aircraft and Parts
373. Ship and Boat Building and Repairing
374. Railroad Equipment
375. Motorcycles, Bicycles and Parts
376. Guided Missiles and Space Vehicles and Parts
379. Miscellaneous Transportation Equipment

Each major group or industry group consists of the establishments classified according to their major activity.

UNFILLED ORDERS
........See ORDERS, UNFILLED

UNIT LABOR COST
........Unit labor cost is arrived at by dividing compensation per man-hour by output per man-hour.

VACATIONS, PAID
........See COMPENSATION, SUPPLEMENTARY

VALUE ADDED
........Value added by manufacture is derived by subtracting the total cost of materials (including materials, supplies, fuel, electric energy, cost of resales and miscellaneous receipts) from the value of shipments (including resales) and other receipts, and adjusting the resulting amount by the net change in finished products and work-in-process inventories between the beginning and end of the year.

Value added by manufacture avoids the duplication in the value of shipments figure which results from the inclusion of the shipments of establishments producing materials and components along with the shipments of establishments producing finished products.

VALUE, IN FOREIGN COUNTRY
........See IMPORTS INTO THE UNITED STATES

VALUE, AT PORT
........See EXPORTS OF DOMESTIC MERCHANDISE

VALUE OF SHIPMENTS
........See SHIPMENTS

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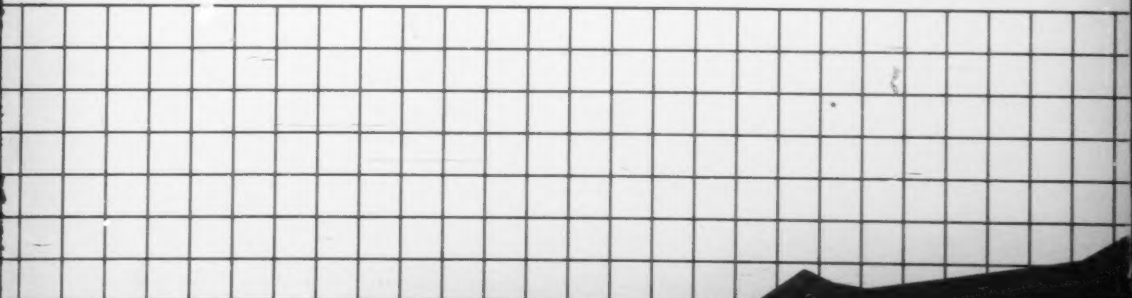

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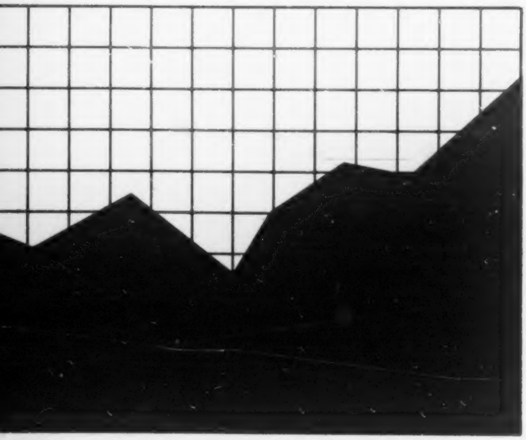

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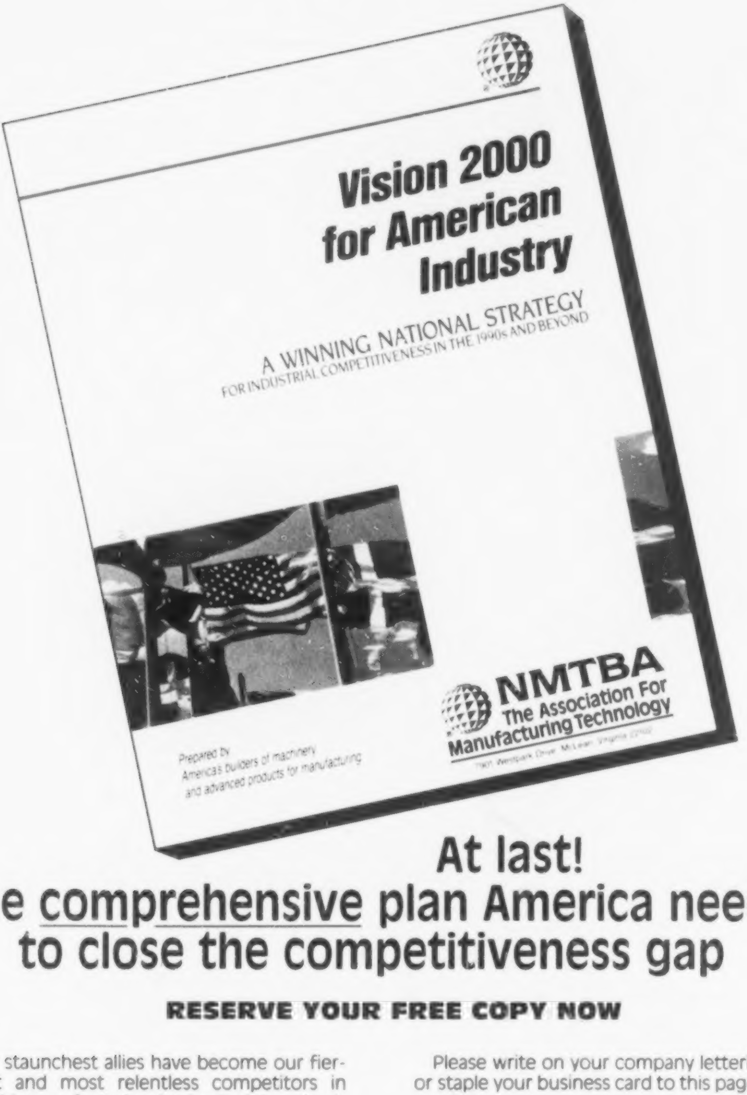
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MESSAGE FROM THE PRESIDENT OF NMTBA

The pace of world change is accelerating rapidly. The Berlin Wall is down, the liberalization of the Soviet Union continues, Europe is preparing for 1992, Asia's engines of growth continue to hum, and democracy and free markets progress in Latin America.

We are witnessing a reshaping of the global order, and that calls for a reevaluation of ourselves as a nation. The lessening of military tensions is encouraging new priorities and measures of national progress.

Industrial competitiveness is now the "battleground." And the role of the U.S. machine tool industry and manufacturing technology is being redefined. Our industry provides the tools to fight competitive battles; tools that will allow U.S. manufacturers to work toward continuous improvement; to exploit new and exotic materials; and to harness the power of the laser, microprocessor and artificial intelligence in the manufacturing process.

It will not be easy, and many challenges still remain. U.S. companies are competing against foreign companies who often enjoy significant assistance from their governments. In order to strengthen our industrial base, U.S. business must find ways to work in partnership with government and universities, to confront the new realities. Meeting these challenges requires a significant effort by all to improve our technology, education, training, information gathering programs and management skills.

Keeping you a step ahead of changing world events and trends is our job at NMTBA. To do this we are working to provide new and enhanced programs and services, including international trade promotion, quality systems, expanded market data, educational assistance, etc. Our goal is to help our member companies, and U.S. manufacturers, prepare to meet the competition. While the pace of global change is accelerating rapidly, the pace of change at NMTBA is accelerating rapidly too.

Albert W. Moore

Albert W. Moore
President

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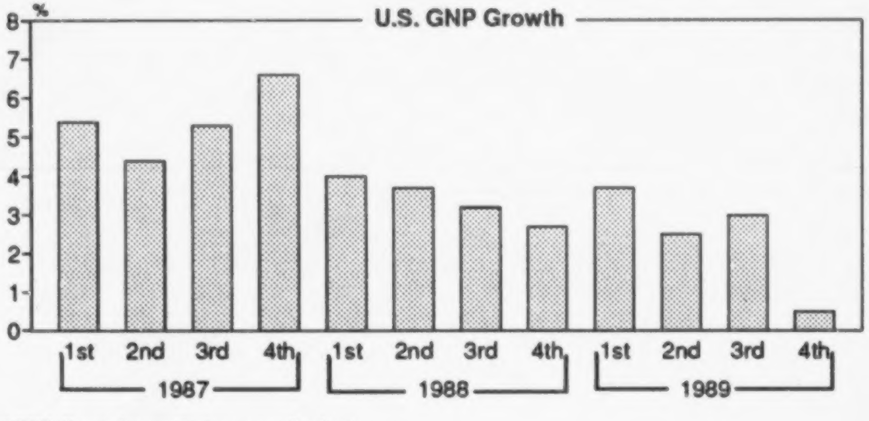
1990 IN PERSPECTIVE

The U.S. Economy

As we enter the nineties, the longest peacetime economic expansion in U.S. history continues. The U.S. economy has grown each year since the last U.S. recession, which occurred during 1981–82. During the first part of 1990, the economy remains buoyant as:

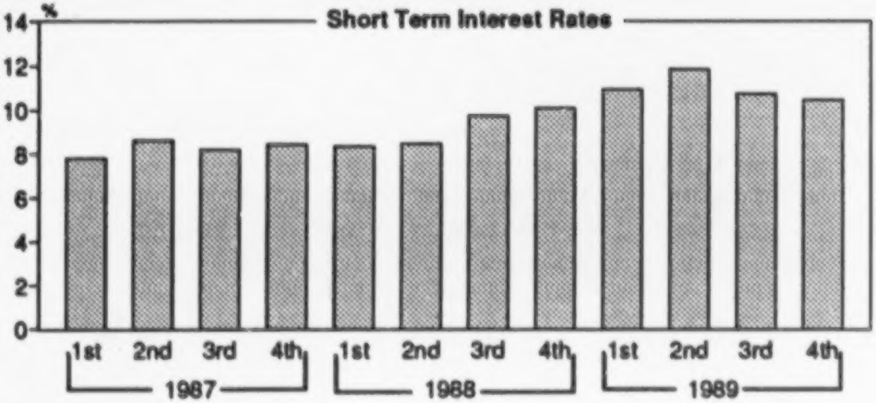
- U.S. business keeps inventories under control, not allowing over-accumulation;
- the U.S. Federal Reserve steers a policy course aimed toward maintaining low inflation; and
- severe external shocks (such as the oil embargo crisis in the 1970s) have not been suffered by the economy.

According to the President's Council of Economic Advisors, economic downturns are caused by policy mistakes by the government or by imbalances in the economy, such as inventory over-accumulation, high inflation or external shocks.

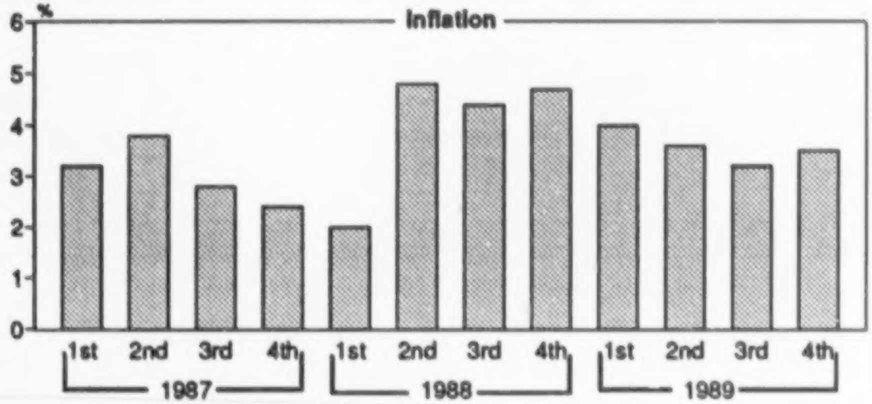


Real GNP. Quarterly growth at an annualized rate

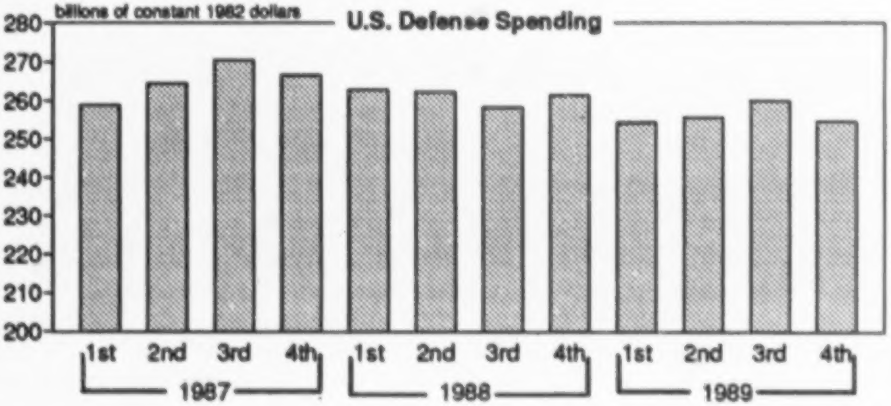
Nonetheless, the expansion began slowing in late 1989 and into the first part of 1990, as interest rates rose in response to the threat of higher inflation, and because defense spending began falling. While higher interest rates have slowed spending for durable goods and residential investment, they also have contributed to a higher national savings rate, a major determinant of the cost of capital and business investment levels.



Source: Federal Reserve Board

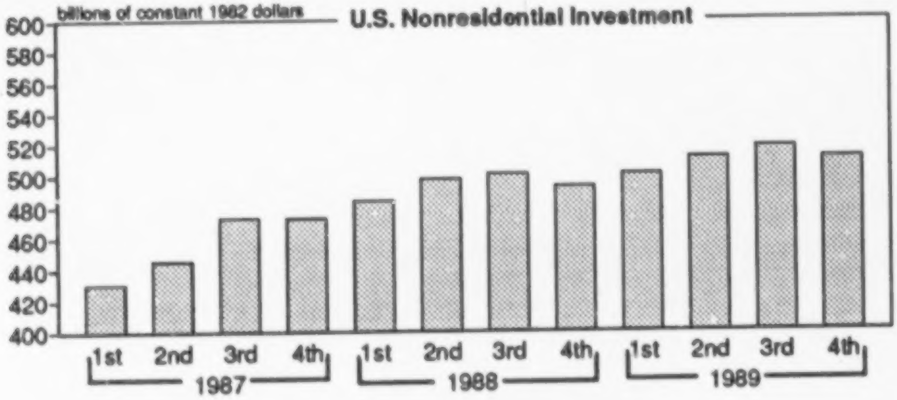


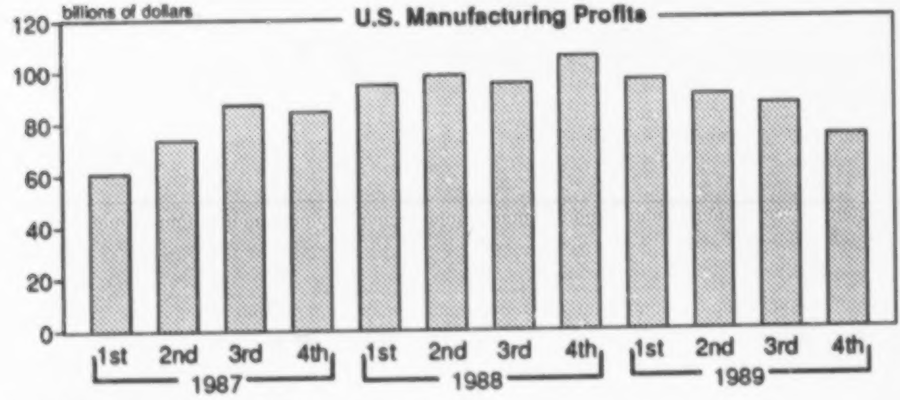
GNP implicit price deflator. Quarterly increase at an annualized rate



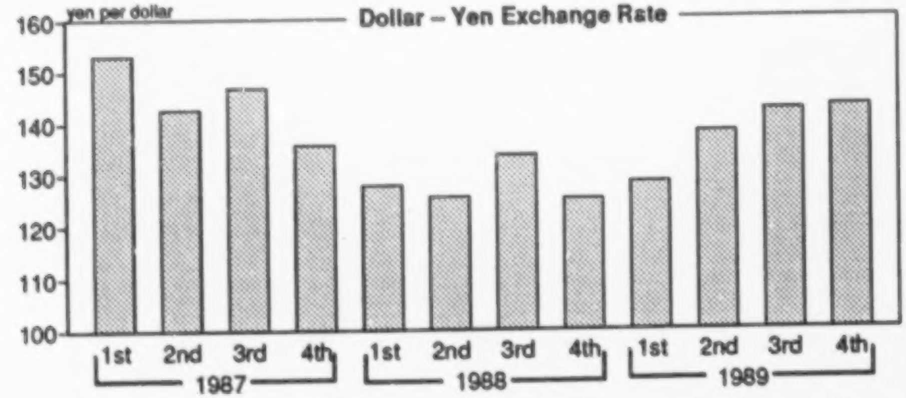
Quarterly spending at an annualized rate

However, U.S. business investment has not kept pace with investment spending abroad, as U.S. companies faced a number of difficulties and uncertainties over the last year: credit became tighter with higher rates and concern about the savings and loan crisis; corporate profits fell sharply in 1989; the U.S. government was unable to resolve automobile fuel economy and environmental standards; and the U.S. dollar moved upward against the yen.

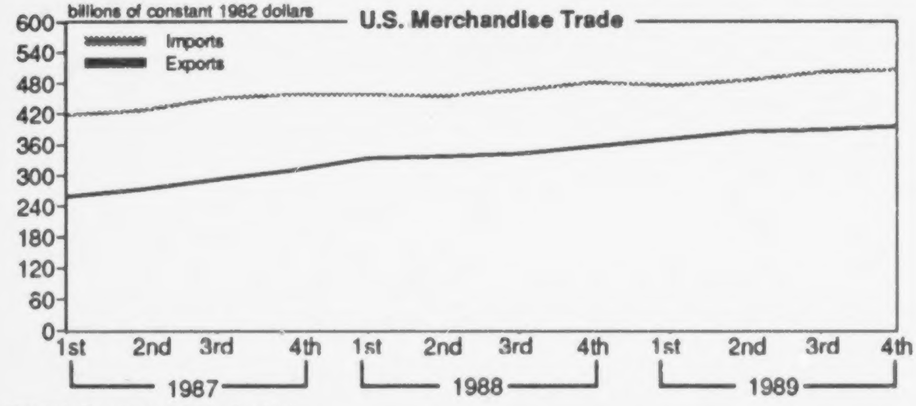




Quarterly profits at an annualized rate



Strong growth in foreign economies has helped to extend the U.S. expansion, as U.S. merchandise exports reached an all–time high in 1989. During 1989, the United States regained its position as the world's leading exporter, with capital goods one of the fastest growing sectors.

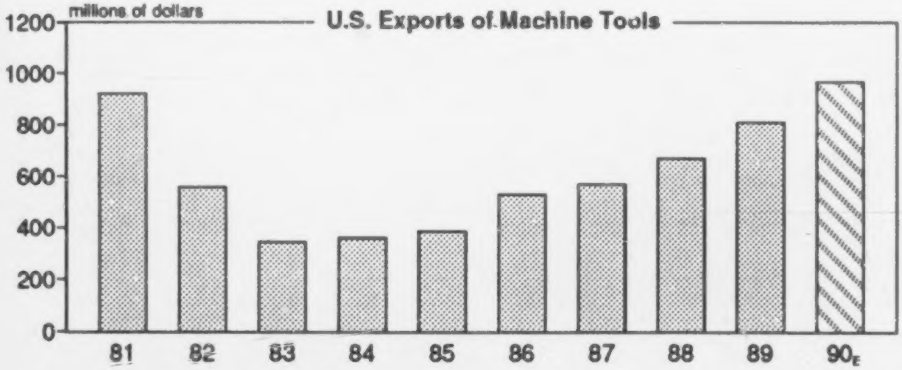


Quarterly figures at an annualized rate

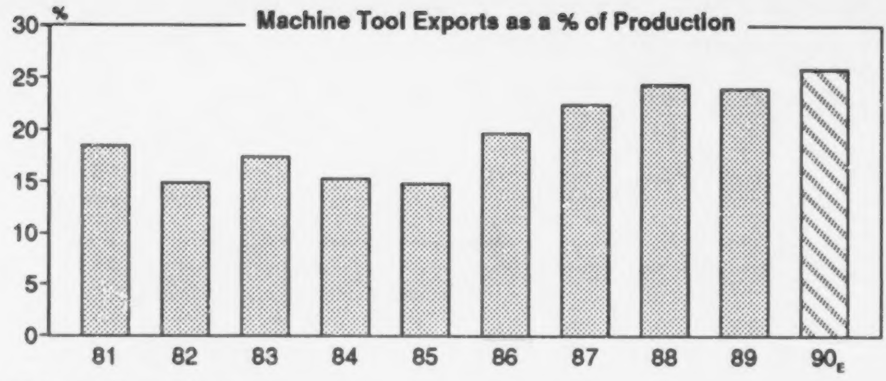
U.S. merchandise imports also reached an all–time high, however, with capital goods imports increasing at nearly the same pace as exports. However, the overall U.S. trade deficit fell for the second consecutive year.

The Machine Tool Perspective

For the U.S. machine tool industry[1], 1989 was a good year for international trade, as exports jumped 21%. The U.S. export total of $812 million represented the second highest level ever, and marked the sixth consecutive annual gain. Export sales as a percentage of domestic production have risen steadily over the last five years and now stands at a post World War II high.

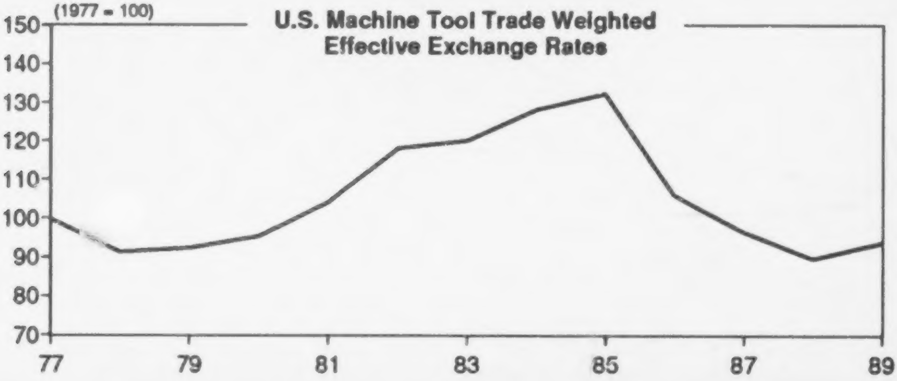


E – Estimated. Through May '90, at an annualized rate



E – Estimated. Through May '90

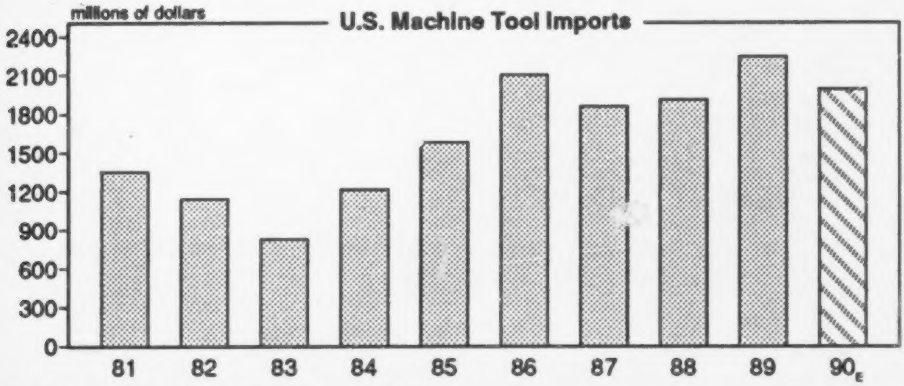
A deep recession and a strong U.S. dollar in the early 1980s caused U.S. machine tool exports to plunge from their 1981 peak of $924 million, to just $345 million in 1983. Significant U.S. export growth and increased U.S. international competitiveness returned with the fall of the U.S. dollar after 1985.



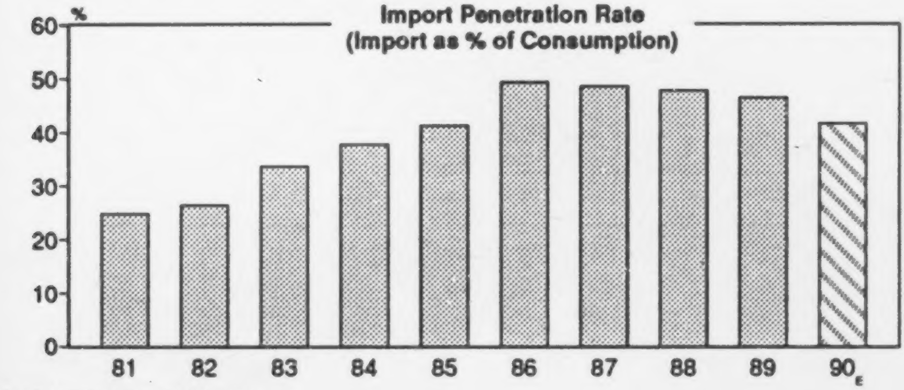
Note: The above graph shows how the value of the U.S. dollar has changed vis–a–vis the currencies of 16 major machine tool trading partners: Mexico, Venezuela, Brazil, Canada, Germany, Italy, the United Kingdom, Belgium, Spain, France, Switzerland, Sweden, Japan, Korea, China and Taiwan. Each country's currency is weighted according to its share of U.S. foreign trade in machine tools; therefore, Japan accounts for the largest share.

In addition, export demand has been boosted by strong economic growth in Asia, preparations for European integration in 1992, economic liberalization in the Soviet Union, the effects of U.S. free trade with Canada and the emerging recovery in Mexico. Further developments in Eastern and Central Europe should also provide a lift to exports in the 1990s, particularly with the liberalization of COCOM restrictions.

While exports gained in 1989, so did imports, jumping 15%, after moderating in 1987 and 1988. As a result, the machine tool trade deficit widened in 1989, for the first time since 1986. Despite the increase, the import share of U.S. consumption fell slightly, to 47% in 1989, and imports, as well as import penetration, fell through the first five months of 1990.



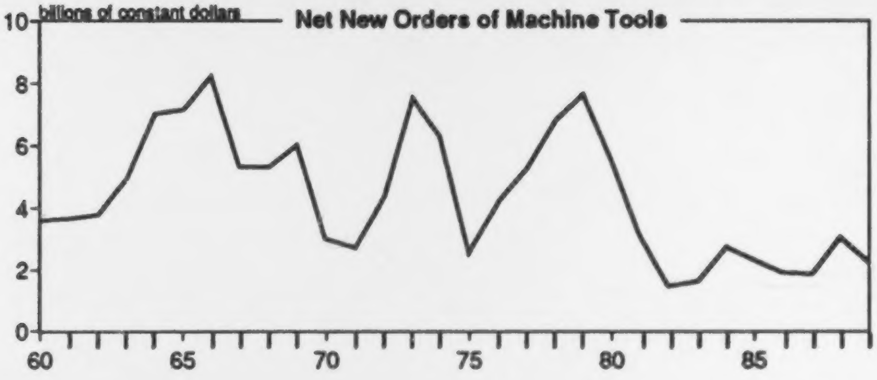
E – Estimated. Through May '90, at an annualized rate



E – Estimated. Through May '90

The lower import penetration rate in 1989 was due to the highest U.S. domestic machine tool shipment level since 1982, $3.4 billion in 1989. The shipment gain in 1989 came as a result of a nearly 70% jump in U.S. machine tool orders in 1988.

In 1989, however, orders fell 22% from the 1988 level. While 1988 and (to a lesser extent) 1989 represent relatively good order years in current dollar terms (when compared to the mid–1980s), U.S. machine tool orders remain at historically low levels when adjusted for inflation.



Looking Back, Looking Ahead

The 1980s could be described as a decade of restructuring for U.S. machine tool builders, as import penetration doubled and the U.S. industry experienced a decline in employment: between 1980 and 1989, the U.S. industry suffered a loss of nearly one–third of its employees, from 108,000 to 72,500.

However, the U.S. machine tool industry has seen some encouraging signs recently. Since 1983, industry productivity has increased substantially, and employment has grown since 1987 due to the recent strength of exports and shipments.

Some analysts point to the potential of increased demand for new machine tools and manufacturing technology during the 1990s, as manufacturers in general must invest to remain competitive. NMTBA estimates through the first two quarters of 1990 show U.S. machine tool domestic shipments ahead of 1989, and U.S. machine tool exports and export orders up significantly. While 1989 may have been a good year for exports, the 1990s hold promise of being the decade of the export.

---

[1] Data cited in this section only represent new machine tools with a value of over $2,500.

[E] Estimated.

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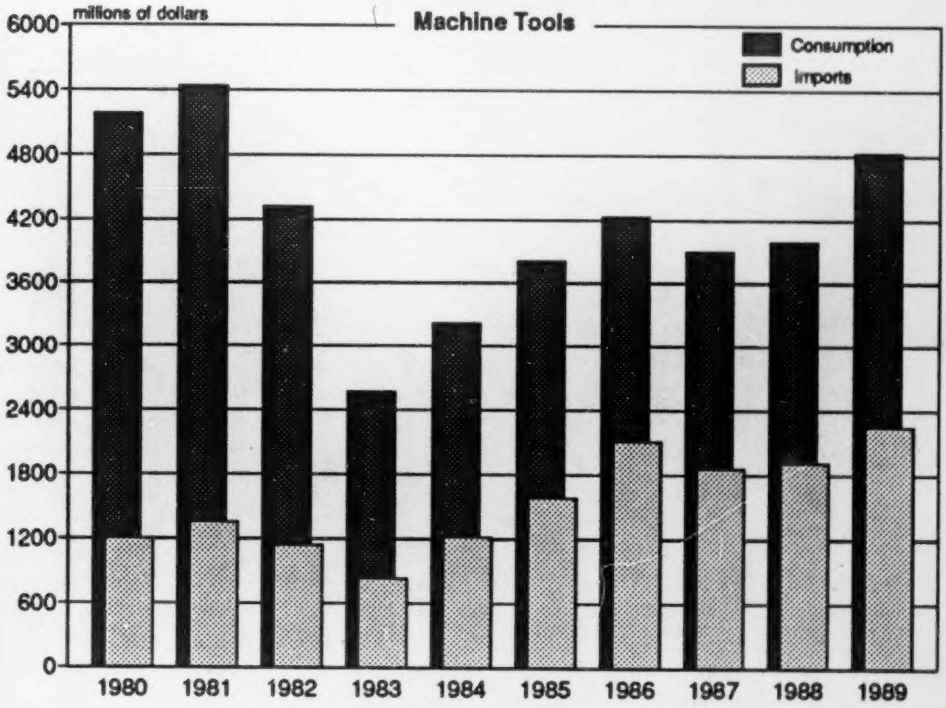
UNITED STATES DOMESTIC CONSUMPTION OF NEW COMPLETE MACHINE TOOLS



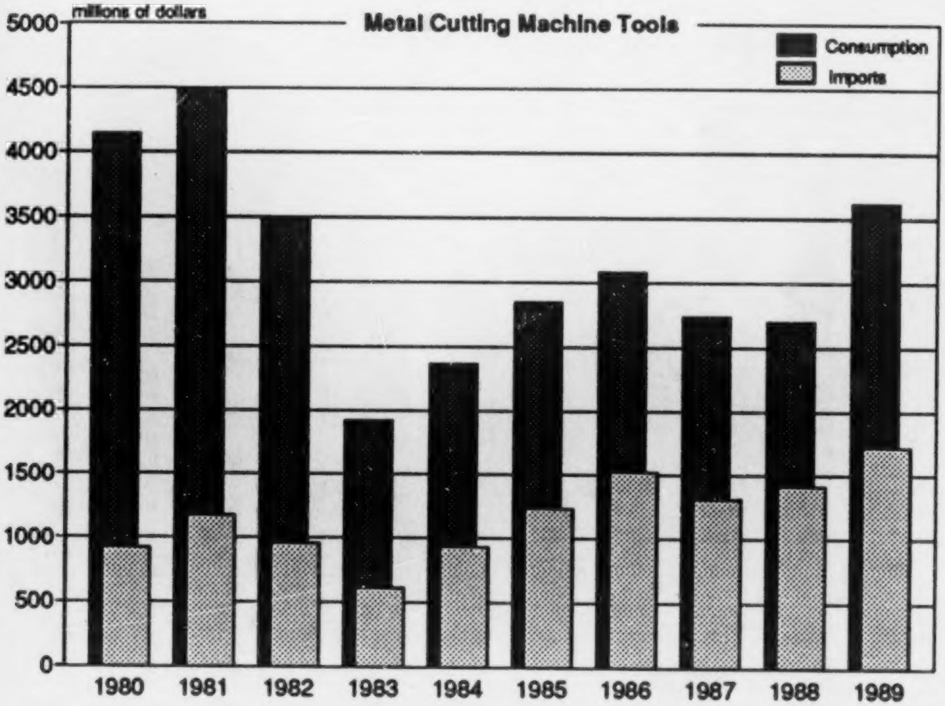
Total Machine Tools

(in millions of dollars)

Year	Shipments +	Imports –	Exports =	U.S. Consumption	% Import Penetration
1980	$4,674.1	$1,206.4	$711.0	$5,169.5	23.3%
1981	5,007.8	1,355.9	924.1	5,439.6	24.9
1982	3,738.4	1,144.1	556.5	4,325.9	26.4
1983	2,086.2	832.4	345.0	2,573.6	32.3
1984	2,362.2	1,218.9	360.9	3,220.2	37.9
1985	2,623.6	1,582.1	387.2	3,818.6	41.4
1986	2,655.6	2,105.8	530.7	4,230.7	49.8
1987	2,612.1	1,859.9	567.7	3,904.2	47.6
1988	2,753.3	1,913.4	670.9	3,995.9	47.9
1989(p)	3,393.8	2,246.3	812.3	4,827.8	46.5

For machines valued at $2,500 or more.

U.S. CONSUMPTION



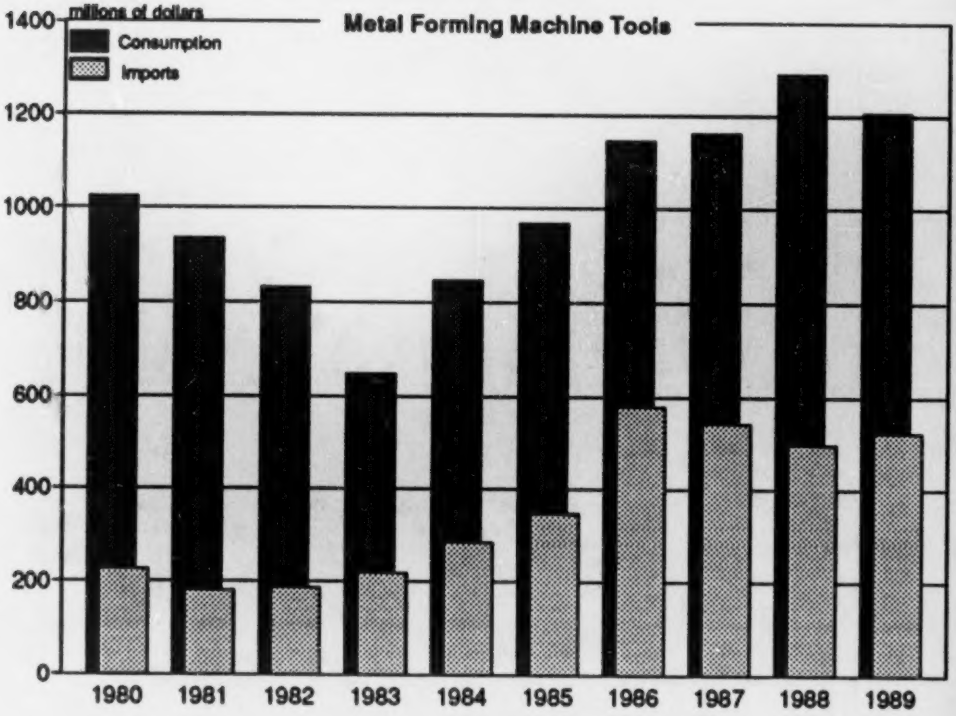
Metal Cutting Machine Tools

(in millions of dollars)

Year	Shipments +	Imports −	Exports =	U.S. Consumption	% Import Penetration
1980	$3,612.6	$ 979.9	$446.7	$4,145.8	23.6%
1981	3,979.0	1,174.5	649.4	4,504.1	26.1
1982	2,899.4	956.7	361.8	3,494.3	27.4
1983	1,532.2	613.6	220.3	1,925.5	31.9
1984	1,654.2	933.2	213.9	2,373.5	39.3
1985	1,846.8	1,235.0	232.8	2,849.1	43.3
1986	1,880.5	1,526.7	322.1	3,085.1	49.4
1987	1,748.7	1,316.9	324.2	2,741.3	48.0
1988	1,656.8	1,415.0	366.7	2,705.1	52.3
1989(p)	2,317.5	1,723.0	419.9	3,620.6	47.6

For machines valued at $2,500 or more.

U.S. CONSUMPTION



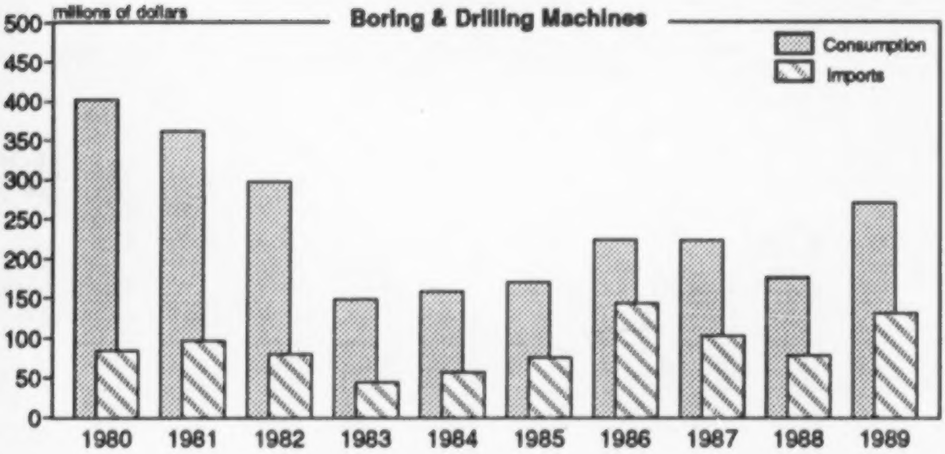
Metal Forming Machine Tools

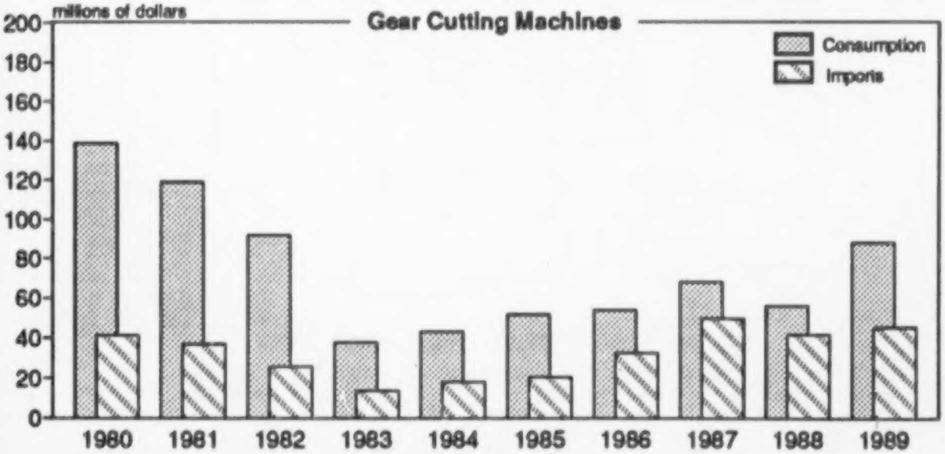
(in millions of dollars)

Year	Shipments +	Imports −	Exports =	U.S. Consumption	% Import Penetration
1980	$1,061.4	$226.5	$264.2	$1,023.7	22.1%
1981	1,028.9	181.3	274.8	935.5	19.4
1982	839.0	187.4	194.7	831.7	22.5
1983	554.0	218.8	124.7	648.1	33.8
1984	708.0	285.7	147.0	846.7	33.7
1985	776.7	347.2	154.4	969.5	35.8
1986	775.1	579.1	208.7	1,145.5	50.5
1987	863.3	543.1	243.5	1,162.9	46.7
1988	1,096.6	498.4	304.1	1,290.9	38.6
1989(p)	1,076.3	523.3	392.4	1,207.1	43.3

For machines valued at $2,500 or more.

U.S. CONSUMPTION


Boring & Drilling Machines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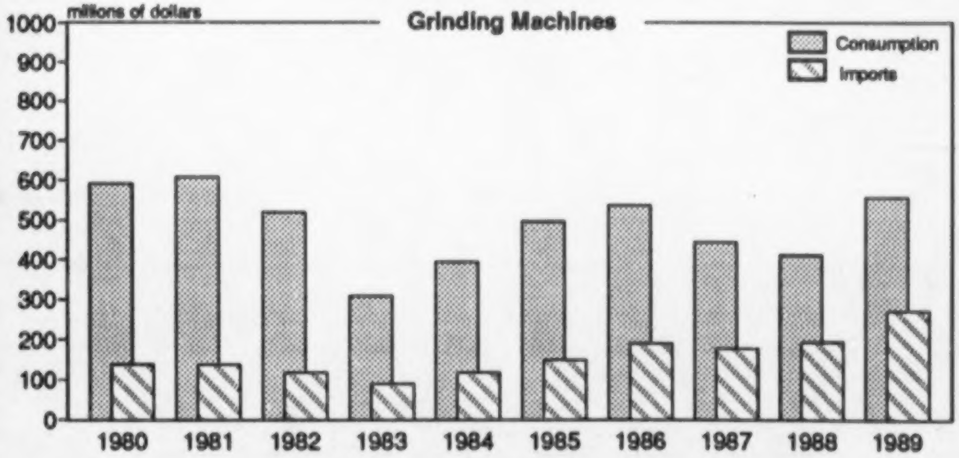

Grinding Machines

U.S. CONSUMPTION

Boring And Drilling Machines

(in millions of dollars)

Year	Shipments +	Imports −	Exports =	U.S. Consumption	% Import Penetration
1980	$359.8 E	$84.5	41.8	402.6 E	21.0% E
1981	350.7 E	96.8	85.1	362.4 E	26.7 E
1982	247.5 E	79.9	30.2	297.2 E	26.9 E
1983	125.6	44.5	21.2	148.9	29.9
1984	123.6	57.4	22.0	159.0	36.1
1985	120.1	75.6	25.7	170.0	44.5
1986	114.0	143.6	33.8	223.9	64.1
1987	145.1	103.0	25.0	223.1	46.2
1988	125.2	78.5	27.8	175.9	44.6
1989(p)	172.4	131.2	32.5	271.1	48.4

For machines valued at $2,500 or more.

Gear Cutting Machines

(in millions of dollars)

Year	Shipments +	Imports −	Exports =	U.S. Consumption	% Import Penetration
1980	$130.3	$41.3	$32.8 E	$138.8 E	29.8% E
1981	133.1	37.0	51.1 E	119.0 E	31.1 E
1982	86.5	25.8	20.5 E	91.9 E	28.1 E
1983	35.8	13.8	11.8	37.8	36.7
1984	42.4	18.1	17.3	43.2	41.9
1985	51.8	20.5	20.4	51.8	39.5
1986	57.3	32.6	35.6	54.3	60.1
1987	59.6	50.0	41.5	68.1	73.4
1988	48.9	41.8	34.5	56.2	74.4
1989(p)	96.7	45.5	53.9	88.3	51.5

For machines valued at $2,500 or more.

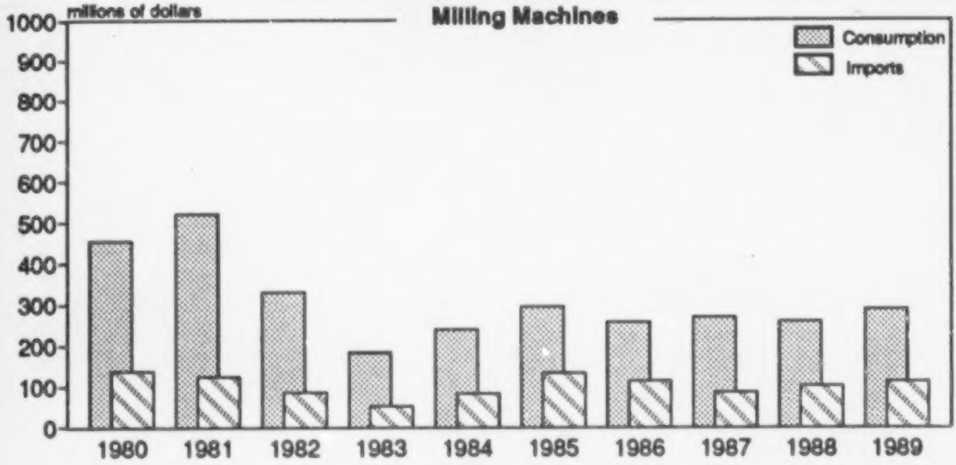
Grinding Machines

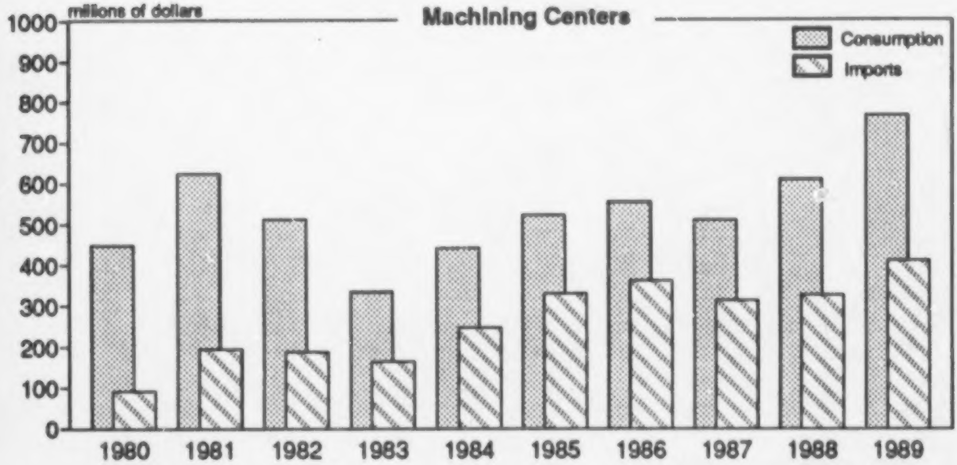
(in millions of dollars)

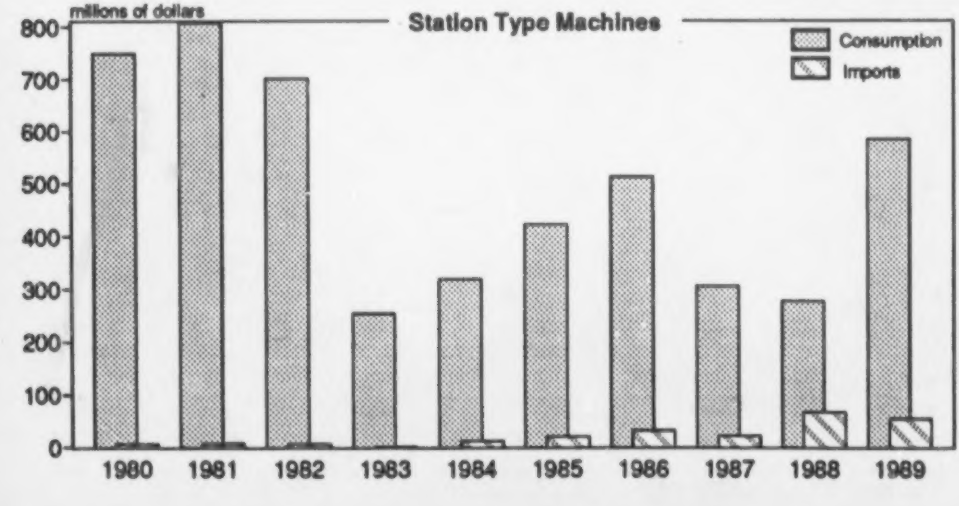
Year	Shipments +	Imports −	Exports =	U.S. Consumption	% Import Penetration
1980	$539.0	$138.6	$ 85.1	$592.5	23.4%
1981	597.5	137.2	126.5	608.1	22.6
1982	473.5	117.6	71.1	519.9	22.6
1983	268.7	89.5	49.0	309.3	28.9
1984	321.8	118.5	46.7	393.7	30.1
1985	404.2	147.9	56.6	495.5	29.9
1986	408.3	190.0	60.4	537.9	35.3
1987	371.6	177.6	103.7	445.5	39.9
1988	343.6	194.7	125.8	412.6	47.2
1989(p)	413.2	273.6	128.4	558.5	49.0

For machines valued at $2,500 or more.

U.S. CONSUMPTION







U.S. CONSUMPTION

Milling Machines

Year	Shipments	+	Imports	–	Exports	=	U.S. Consumption	% Import Penetration
1980	$338.3		$138.1		$19.2		$457.2	30.2%
1981	435.6		124.7		37.8		522.5	23.9
1982	265.0		87.7		22.4		330.3	26.5
1983	145.7		52.5		13.9		184.2	28.5
1984	179.0		83.4		22.7		239.8	34.8
1985	180.0		133.7		19.3		294.4	45.4
1986	168.3		113.8		25.2		256.9	44.2
1987	206.0		87.4		24.7		268.6	32.5
1988	183.8		103.1		28.2		258.7	39.8
1989(p)	203.4		112.5		27.2		288.6	39.0

For machines valued at $2,500 or more.

Machining Centers

Year	Shipments	+	Imports	–	Exports	=	U.S. Consumption	% Import Penetration
1980	$413.0		$ 93.4		$56.7		$449.7	20.8%
1981	482.7		195.7		53.4		625.0	31.3
1982	357.6		188.9		34.0		512.5	36.9
1983	182.9		164.9		13.3		334.5	49.3
1984	213.2		248.0		18.6		442.6	56.0
1985	214.7		330.0		21.0		523.7	63.0
1986	213.4		361.8		20.5		554.7	65.2
1987	217.8		313.4		20.6		510.7	61.4
1988	314.2		326.3		30.8		609.6	53.5
1989(p)	402.8		410.5		45.7		767.6	53.5

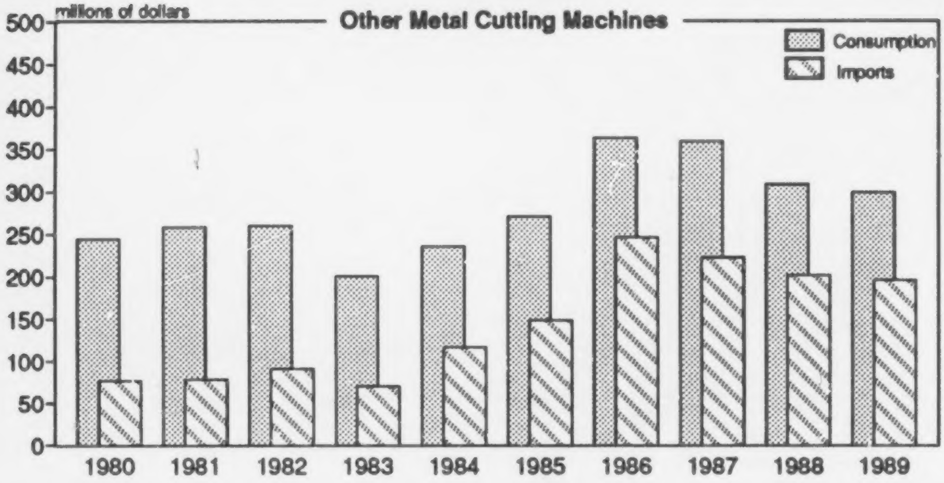
For machines valued at $2,500 or more.

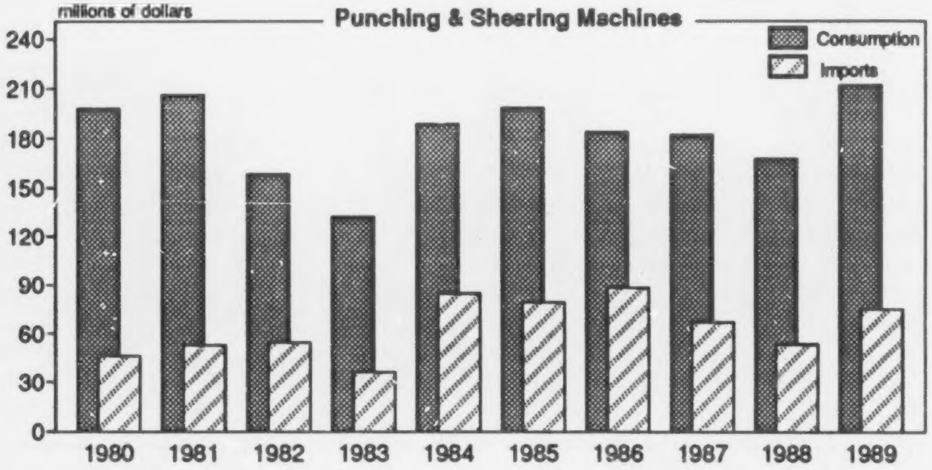
Station–type Machines

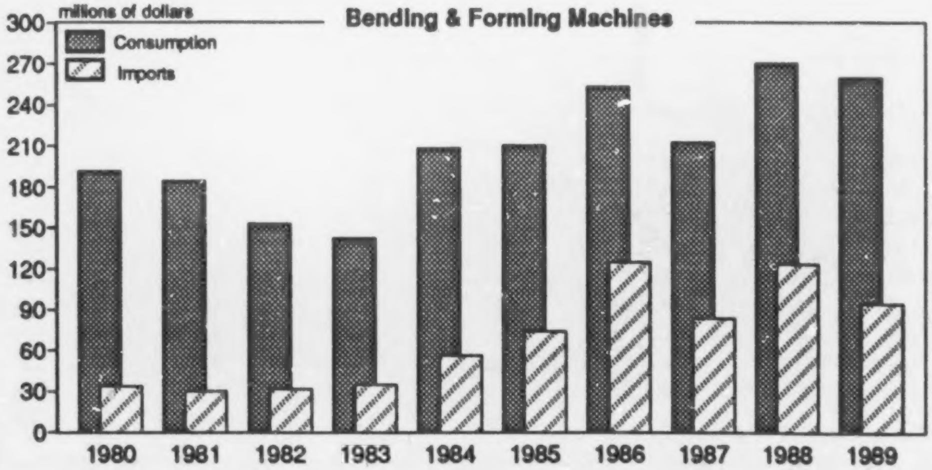
Year	Shipments	+	Imports	–	Exports	=	U.S. Consumption	% Import Penetration
1980	$793.6		$ 7.5		$51.7		$749.4	1.0%
1981	896.1		8.5		97.2		807.4	1.1
1982	731.1		7.4		36.4		702.2	1.1
1983	274.0		1.6		21.1		254.5	0.6
1984	311.9		12.7		5.2		319.5	4.0
1985	406.1		20.6		4.3		422.4	4.9
1986	517.7		32.5		37.5		512.8	6.3
1987	299.6		22.9		16.8		305.7	7.5
1988	225.4		67.5		13.6		279.3	24.2
1989(p)	562.7		55.0		31.7		586.0	9.4

For machines valued at $2,500 or more.

U.S. CONSUMPTION







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U.S. CONSUMPTION

Other Metal Cutting Machines

(in millions of dollars)

Year	Shipments +	Imports –	Exports =	U.S. Consumption	% Import Penetration
1980	$247.0	$ 76.9	$\$78.8_E$	$\$245.1_E$	$31.4\%_E$
1981	269.6	78.6	89.5_E	258.7_E	30.4_E
1982	231.4	91.2	62.3_E	260.3_E	35.0_E
1983	179.3	70.9	49.3	201.0	35.3
1984	154.7	116.7	36.1	235.3	49.6
1985	151.3	149.1	28.9	271.5	54.9
1986	139.6	246.2	22.4	363.4	67.7
1987	165.4	222.9	29.0	359.3	62.0
1988	146.0	202.2	39.4	308.8	65.5
1989(p)	160.8	195.8	57.3	299.3	65.4

For machines valued at $2,500 or more.

Punching And Shearing Machines

(in millions of dollars)

Year	Shipments +	Imports –	Exports =	U.S. Consumption	% Import Penetration
1980	$196.7	$46.1	$44.8	$198.1	23.3%
1981	198.1	52.9	44.9	206.1	25.7
1982	136.5	54.8	32.9	158.3	34.6
1983	114.2	36.4	18.1	132.5	27.5
1984	126.6	84.8	22.6	188.7	44.9
1985	137.4	79.4	18.1	198.6	40.0
1986	117.6	88.4	21.8	184.1	48.0
1987	137.7	67.1	22.5	182.3	36.8
1988	162.3	53.6	48.3	167.7	32.0
1989(p)	194.5	75.3	57.4	212.4	35.4

For machines valued at $2,500 or more.

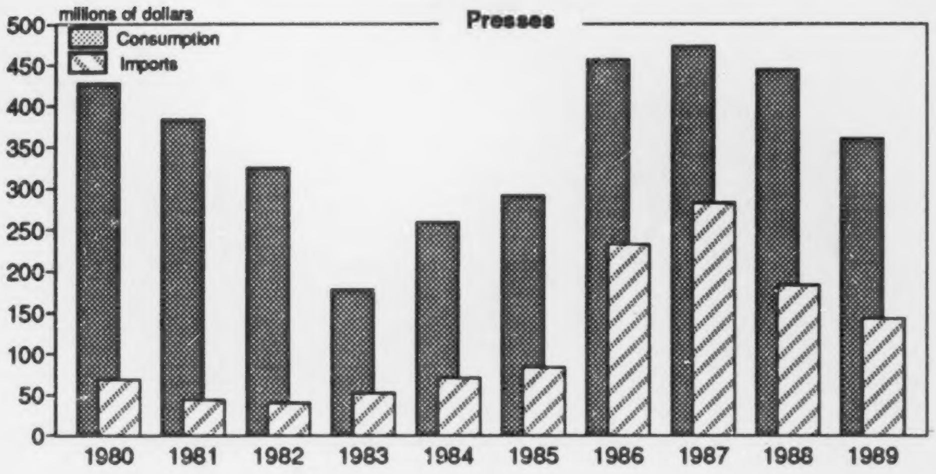
Bending And Forming Machines

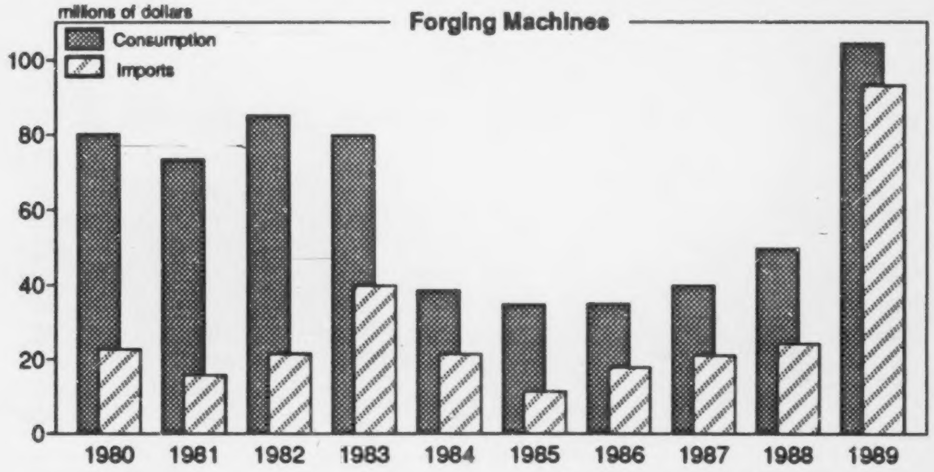
(in millions of dollars)

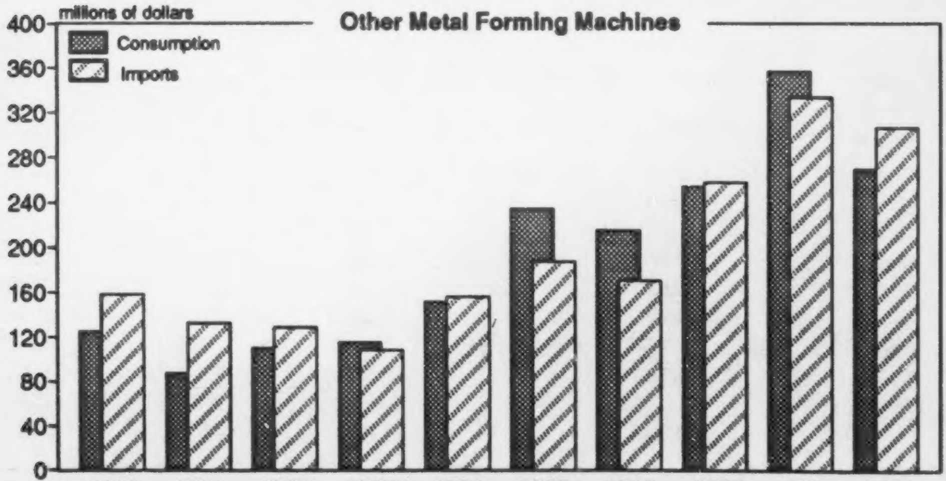
Year	Shipments +	Imports –	Exports =	U.S. Consumption	% Import Penetration
1980	$202.6	$33.6	$44.5	$191.7	17.5%
1981	200.5	30.1	46.0	184.6	16.3
1982	156.5	31.7	35.1	153.2	20.7
1983	127.0	34.9	19.7	142.2	24.5
1984	171.2	56.2	19.4	208.1	27.0
1985	166.7	74.2	30.3	210.6	35.2
1986	162.0	125.0	33.9	253.2	49.4
1987	162.6	83.8	33.3	213.0	39.3
1988	196.0	123.7	49.1	270.7	45.7
1989(p)	212.3	94.4	46.7	260.0	36.3

For machines valued at $2,500 or more.

U.S. CONSUMPTION







U.S. CONSUMPTION

Presses

(in millions of dollars)

Year	Shipments +	Imports −	Exports =	U.S. Consumption	% Import Penetration
1980	$429.9	$ 68.4	$69.7	$428.6	16.0%
1981	418.6	44.3	79.4	383.6	11.6
1982	338.3	40.3	53.8	324.8	12.4
1983	156.1	52.2	30.0	178.4	29.3
1984	224.9	70.6	36.0	259.4	27.2
1985	250.0	83.0	41.7	291.3	28.5
1986	288.1	232.9	63.5	457.5	50.9
1987	261.7	282.7	71.1	473.3	59.7
1988	351.2	183.6	89.2	445.6	41.2
1989(p)	310.0	142.8	92.4	360.4	39.6

For machines valued at $2,500 or more.

Forging Machines

(in millions of dollars)

Year	Shipments +	Imports −	Exports =	U.S. Consumption	% Import Penetration
1980	$73.8	$22.8	$16.4	$80.2	28.5%
1981	79.0	15.8	21.3	73.4	21.5
1982	79.0	21.5	15.3	85.2	25.3
1983	48.0	39.8	7.9	79.9	49.8
1984	29.0	21.4	11.8	38.6	55.3
1985	35.4	11.5	12.2	34.7	33.3
1986	36.7	17.9	19.7	34.9	51.2
1987	42.7	21.1	23.9	39.9	52.8
1988	52.5$_E$	24.2	27.1	49.7$_E$	48.8$_E$
1989(p)	52.5$_E$	93.1	41.1	104.5$_E$	89.1$_E$

For machines valued at $2,500 or more.

Other Metal Forming Machines

(in millions of dollars)

Year	Shipments +	Imports −	Exports =	U.S. Consumption	% Import Penetration
1980	$158.4	$ 55.5	$ 88.8	$125.0	44.4%
1981	132.6	38.3	83.1	87.8	43.6
1982	128.7	39.0	57.6	110.1	35.4
1983	108.6	55.6	49.0	115.1	48.3
1984	156.3	52.8	57.2	151.9	34.8
1985	187.3	99.0	52.1	234.2	42.3
1986	170.7	114.8	69.8	215.7	53.2
1987	258.6	88.4	92.7	254.4	34.7
1988	334.5	113.2	90.4	357.2	31.7
1989(p)	307.0	117.7	154.7	269.9	43.6

For machines valued at $2,500 or more.

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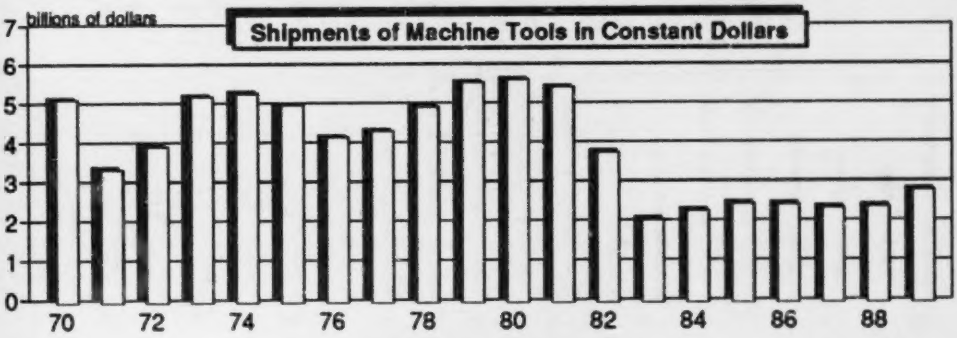
U.S. SHIPMENTS OF MACHINE TOOLS

Metal Cutting and Metal Forming

(in millions of dollars)

Year	Total Shipments		Machines Valued $2,500 or More		Machines Valued Less Than $2,500	
	Units	Value	Units	Value	Units	Value
1980	323,899	$4,812.3	88,428$_E$	$4,674.1$_E$	235,471$_E$	138.3_E$
1981	301,313	5,111.3	87,981$_E$	5,007.8$_E$	213,332$_E$	103.4$_E$
1982	178,638	3,804.3	53,141$_E$	3,738.4$_E$	125,497$_E$	65.9$_E$
1983	150,837	2,144.8	43,199$_E$	1,986.2$_E$	107,638$_E$	58.7$_E$
1984	162,438	2,426.4	49,511$_E$	2,362.3$_E$	112,927$_E$	64.1$_E$
1985	147,147	2,682.2	50,108$_E$	2,623.6$_E$	97,039$_E$	58.6$_E$
1986	134,485	2,709.8	45,589$_E$	2,655.6$_E$	88,896$_E$	54.2$_E$
1987(r)	141,120$_E$	2,668.7$_E$	43,028$_E$	2,612.1$_E$	98,092$_E$	56.6$_E$
1988(r)	159,401$_E$	2,816.3$_E$	50,361$_E$	2,753.3$_E$	109,040$_E$	63.0$_E$
1989(p)	147,566$_E$	3,445.5$_E$	51,858$_E$	3,393.8$_E$	95,708$_E$	61.7$_E$



Constant Dollar Table

(in millions of constant 1982 dollars)

Year	Total Shipments		Machines Valued $2,500 or More[1]		Machines Valued Less Than $2,500[1]	
	Units	Value	Units	Value	Units	Value
1970	252,431	$5,155.4	73,517	$4,988.2	178,914	$167.2
1971	211,432	3,379.8	51,843	3,224.9	159,589	154.9
1972	267,065	3,954.2	71,655	3,802.2	195,410	152.0
1973	307,680	5,227.6	94,833	5,043.0	212,847	184.6
1974	337,799	5,308.9	106,016	5,137.7	231,783	170.9
1975	280,341	5,012.7	92,731	4,904.0	187,610	108.6
1976	270,875	4,189.0	82,937	4,076.6	187,938	112.3
1977	284,583	4,350.0	92,270	4,244.6	192,313	105.4
1978	327,460	4,956.8	87,589	4,811.1	239,871	145.7
1979	345,218	5,582.5	89,586	5,404.6	255,632	177.9
1980	323,899	5,648.3	88,428	5,486.0	235,471	162.3
1981	301,313	5,455.4	87,981	5,344.6	213,332	110.4
1982	178,638	3,804.3	53,141	3,738.4	125,497	65.9
1983	150,837	2,096.6	43,199	1,941.6	107,638	105.2
1984	162,438	2,319.7	49,511	2,258.4	112,927	61.3
1985	147,147	2,502.1	50,108	2,447.3	97,039	54.7
1986	134,485	2,477.0	45,589	2,427.5	88,896	49.5
1987(r)	141,120$_E$	2,387.1	43,028	2,336.4	98,092	56.6
1988(r)	154,973$_E$	2,434.4	50,361	2,379.9	109,040	54.5
1989(p)	147,566$_E$	2,840.2	51,858	2,789.3	95,708	50.9

[1] *Data prior to 1978 are for machine tools valued under and over $1,000*

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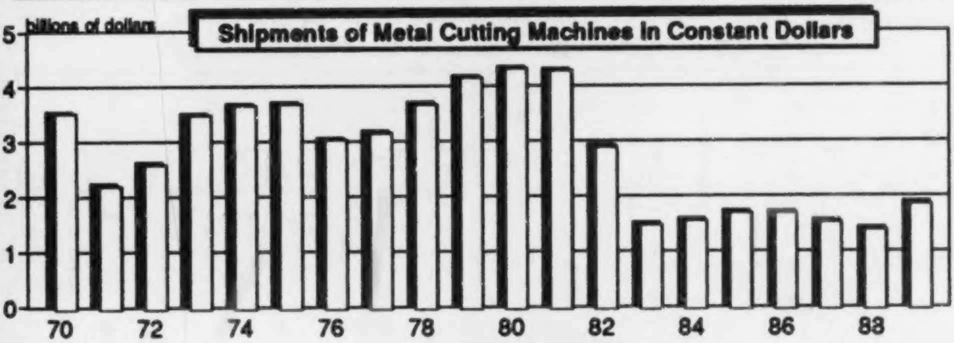
U.S. SHIPMENTS OF MACHINE TOOLS

Metal Cutting

(in millions of dollars)

	Total Shipments		Machines Valued $2,500 or More		Machines Valued Less Than $2,500	
Year	Units	Value	Units	Value	Units	Value
1980	248,563	$3,716.4	62,185$_E$	$3,612.6$_E$	186,378$_E$	103.7_E$
1981	234,647	4,046.9	66,076$_E$	3,979.0$_E$	168,571$_E$	68.0$_E$
1982	130,434	2,940.6	35,060$_E$	2,899.4$_E$	95,374$_E$	41.2$_E$
1983	100,764	1,564.2	27,088$_E$	1,532.2$_E$	73,676$_E$	32.0$_E$
1984	105,740	1,688.3	31,737$_E$	1,654.3$_E$	74,003$_E$	34.0$_E$
1985	93,802	1,877.3	31,425$_E$	1,846.8$_E$	62,377$_E$	30.4$_E$
1986	89,565	1,911.6	27,677$_E$	1,880.5$_E$	61,888$_E$	31.1$_E$
1987(r)	92,711	1,780.7	25,449$_E$	1,748.7$_E$	67,262$_E$	32.0$_E$
1988(r)	104,145	1,692.9	29,814$_E$	1,656.8$_E$	74,331$_E$	36.2$_E$
1989(p)	100,567	2,355.1	30,966$_E$	2,317.5$_E$	69,601$_E$	37.6$_E$


Shipments of Metal Cutting Machines in Constant Dollars

Constant Dollar Table

(in millions of constant 1982 dollars)

	Total Shipments		Machines Valued $2,500 or More$_1$		Machines Valued Less Than $2,500$_1$	
Year	Units	Value	Units	Value	Units	Value
1970	188,491	$3,564.0	49,314	$3,445.0	139,177	$119.0
1971	157,099	2,246.7	32,443	2,131.6	124,656	115.1
1972	207,290	2,631.8	47,846	2,521.2	159,444	110.6
1973	252,237	3,519.3	63,685	3,376.6	188,552	142.7
1974	272,811	3,702.9	69,060	3,560.0	203,751	143.0
1975	229,169	3,722.2	65,883	3,640.0	163,286	82.3
1976	212,757	3,073.8	54,974	2,985.8	157,783	88.0
1977	220,017	3,198.7	59,500	3,113.8	160,517	84.9
1978	257,647	3,717.2	58,116	3,607.5	199,531	109.7
1979	263,019	4,195.0	59,453$_E$	4,065.2$_E$	203,566$_E$	129.8$_E$
1980	248,563	4,367.1	62,185$_E$	4,245.2$_E$	186,378$_E$	121.9$_E$
1981	234,647	4,323.7	66,076$_E$	4,251.0$_E$	168,571$_E$	72.6$_E$
1982	130,434	2,940.6	35,060$_E$	2,899.4$_E$	95,374$_E$	41.2$_E$
1983	100,764	1,532.0	27,088$_E$	1,500.7$_E$	73,676$_E$	[illegible]1.3$_E$
1984	105,740	1,614.0	31,737$_E$	1,581.5$_E$	74,003$_E$	32.7$_E$
1985	93,802	1,749.6	31,425$_E$	1,721.2$_E$	62,377$_E$	28.4$_E$
1986	89,565	1,744.2	27,677$_E$	1,715.8$_E$	61,888$_E$	28.4$_E$
1987(r)	92,711	1,581.4	25,449$_E$	1,553.0$_E$	67,262$_E$	28.4$_E$
1988(r)	104,145	1,442.0	29,814$_E$	1,411.2$_E$	74,331$_E$	30.8$_E$
1989(p)	100,567	1,908.5	30,966$_E$	1,878.0$_E$	69,601$_E$	30.5$_E$

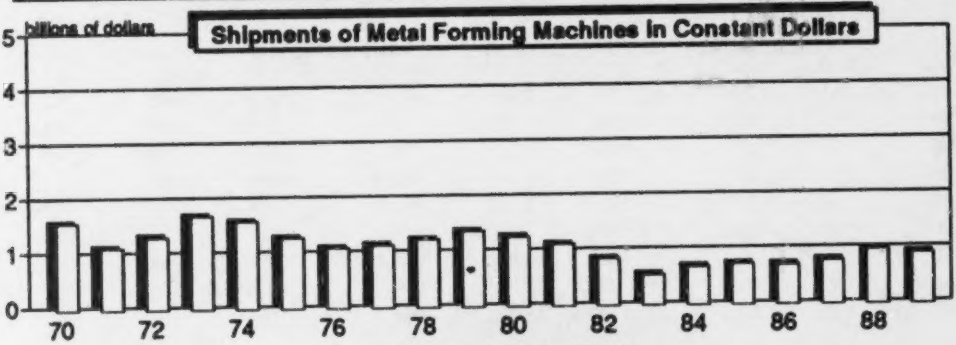
[1]Data prior to 1978 are for machine tools valued under and over $1,000

U.S. SHIPMENTS OF MACHINE TOOLS

Metal Forming

(in millions of dollars)

	Total Shipments		Machines Valued $2,500 or More		Machines Valued Less Than $2,500	
Year	Units	Value	Units	Value	Units	Value
1980	75,336	$1,096.0	26,243	$1,061.4	49,093	$34.6
1981	66,666	1,064.3	21,905	1,028.9	44,761	35.4
1982	48,204	863.6	18,081	839.0	30,123	24.7
1983	50,073	580.6	16,111	554.0	33,962	26.6
1984	56,698	738.1	17,774	708.0	38,924	30.1
1985	53,345	804.9	18,683	776.7	34,662	28.2
1986	44,920	798.2	17,912	775.1	27,008	22.1
1987(r)	48,409	887.9	17,579	863.4	30,830	24.5
1988(r)	55,256	1,123.4	20,547	1,096.6	34,709	26.8
1989(p)	46,999	1,100.4	20,892	1,076.3	26,107	24.1


Shipments of Metal Forming Machines in Constant Dollars

Constant Dollar Table

(in millions of constant 1982 dollars)

	Total Shipments		Machines Valued $2,500 or More[1]		Machines Valued Less Than $2,500[1]	
Year	Units	Value	Units	Value	Units	Value
1970	63,940	$1,587.7	24,203	$1,539.8	39,737	$47.8
1971	54,333	1,129.7	19,400	1,090.6	34,933	39.0
1972	59,775	1,327.1	24,107	1,285.9	35,668	41.0
1973	55,443	1,711.7	31,148	1,670.7	24,295	41.0
1974	64,988	1,600.9	36,956	1,573.8	28,032	27.1
1975	51,172	1,296.3	26,848	1,269.8	24,324	26.5
1976	58,118	1,114.2	27,963	1,089.8	30,155	24.4
1977	64,566	1,151.5	32,770	1,130.9	31,796	20.7
1978	69,813	1,245.3	29,473	1,209.0	40,340	36.2
1979	82,199	1,385.8	30,133	1,337.8	52,066	47.9
1980	75,336	1,278.9	26,243	1,238.5	49,093	40.3
1981	66,666	1,132.2	21,905	1,094.6	44,761	37.7
1982	48,204	863.6	18,081	839.0	30,123	24.7
1983	50,073	565.4	16,111	539.4	33,962	25.9
1984	56,698	705.0	17,774	676.2	38,924	28.7
1985	53,345	752.3	18,683	725.9	34,662	26.3
1986	44,920	734.3	17,912	713.1	27,008	20.3
1987(r)	48,409	805.7	17,579	783.4	30,830	22.2
1988(r)	55,256	992.4	20,547	968.7	34,709	23.7
1989(p)	46,999	931.7	20,892	931.7	26,107	20.4

[1] *Data prior to 1978 are for machine tools valued under and over $1,000*

U.S. SHIPMENTS OF NUMERICALLY CONTROLLED MACHINE TOOLS

(values in millions of dollars)

TOTAL			METAL FORMING			METAL CUTTING		
Year	Units	Value	Year	Units	Value	Year	Units	Value
1980	D	D	1980	D	D	1980	8,889	$1,261.0
1981	D	D	1981	D	D	1981	7,737	1,370.8
1982	D	D	1982	D	D	1982	4,962	1,067.3
1983	D	D	1983	D	D	1983	4,224	625.3
1984	D	D	1984	D	D	1984	4,921	650.3
1985	D	D	1985	D	D	1985	4,953	717.0
1986	5,901	$843.5	1986	1,108	$108.0	1986	4,793	735.5
1987	6,049	931.0	1987	1,118	119.8	1987[1]	5,291	811.2
1988	6,603	958.8	1988	1,373	139.6	1988	5,230	819.2
1989	7,281	1,166.3	1989(p)	1,416	168.7	1989(p)	5,865	997.6

Metal Cutting

BORING & DRILLING MACHINES			LATHES			GRINDING & POLISHING MACHINES		
Year	Units	Value	Year	Units	Value	Year	Units	Value
1980	610	$125.8	1980	2,739	$481.2	1980	271	$32.9
1981	748	173.0	1981	2,021	441.4	1981	645	46.7
1982	231	110.7	1982	1,489	332.8	1982	590	49.6
1983	69	37.1	1983	1,202	224.6	1983	494	42.7
1984	119	45.1	1984	1,497	207.8	1984	546	65.9
1985[1]	89	35.4	1985	1,420	225.2	1985	724	122.4
1986[1]	117	45.9	1986	1,163	188.1	1986	809	144.1
1987	D	D	1987(r)	1,626	225.6	1987	765	135.7
1988(r)	101	42.0	1988	1,763	226.2	1988(r)	688	105.8
1989(p)	121	52.7	1989(p)	1,625	238.2	1989(p)	802	151.5

MILLING MACHINES			MACHINING CENTERS			OTHER METAL CUTTING MACHINES[1]		
1980	2,600	$162.7	1980	2,132	$413.0	1980	537	$45.4
1981	1,763	190.6	1981	2,081	482.7	1981	479	36.4
1982	1,061	185.6	1982	1,396	357.8	1982	140	31.0
1983	1,091	108.9	1983	1,005	182.9	1983	363	29.1
1984	1,434	108.9	1984	1,237	213.2	1984	88	9.4
1985	1,087	99.6	1985	1,077	214.7	1985	556	19.7
1986	1,282	114.2	1986	936	213.4	1986	486	29.8
1987	818	113.2	1987(r)	1,361	217.8	1987(r)	721	118.9
1988	654	84.3	1988(r)	1,770	314.2	1988(r)	254	46.7
1989(p)	739	104.2	1989(p)	2,295	402.8	1989(p)	283	48.2

Metal Forming

PUNCHING, SHEARING, BENDING & FORMING			OTHER METAL FORMING MACHINES		
Year	Units	Value	Year	Units	Value
1980	1095	$110.6	1980	D	D
1981	1208	96.5	1981	D	D
1982	1104	59.3	1982	D	D
1983	557	51.9	1983	D	D
1984	660	89.2	1984	D	D
1985	565	75.0	1985	D	D
1986	537	72.3	1986	571	$35.7
1987	527	87.7	1987	591	32.1
1988	738	107.6	1988	635	32.0
1989(p)	908	128.3	1989(p)	508	40.4

[1] *"Drilling Machines" are included in the "All Other Metal Cutting" category.*

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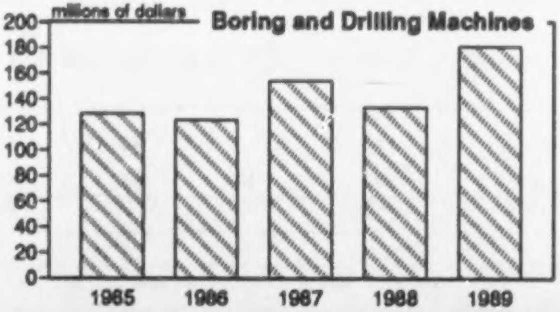
U.S. SHIPMENTS OF BORING AND DRILLING MACHINES

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
Boring and Drilling Mach.	10,259	8,515	7,708	10,131	10,236	$128.9	$123.9	$154.7	$133.9	$181.4
Boring Mach. valued under $2,500	—	—	—	—	—					
Horiz. Boring, Drilling & Milling Mach.:										
Table Type Floor Type	D	D	29	D	D	D	D	18.8	D	D
Precision Boring Machines	372	431	474	422	523	48.9	62.1	84.3	68.6	89.8
Jig Boring Machines	—	—	15	D	D	—	D[2]	3.8	D	D
All Other Boring Machines	—	—	—	—	—	—	—	—	—	—
Drilling Mach. valued under $2,500	8,385	6,742	5,865	7,877	7,376	8.8	9.9	9.5	8.6	9.0
Vertical Drilling Machines	310	291	326	713	957	4.0	3.3	3.2	3.9	5.2
Radial Drilling Machines Deep Hole Drilling Machines	165	125	123	D	D	10.3	8.7	9.7	D	D
Multiple Spindle Drilling Machines:										
Adjustable Joint, Fixed Center	775	752	650	661	893	13.6	12.0	18.7	14.4	17.0
Automatic Drilling All Other	199	121	129	105 D	171 D	7.2	6.1	6.7	6.4 D	6.9 D

[1] There were no machines valued less than $2,500. [2] Included with "All Other Drilling Machines."

Value of Shipments



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U.S. SHIPMENTS OF GEAR CUTTING MACHINES

(values in millions of U.S. dollars)

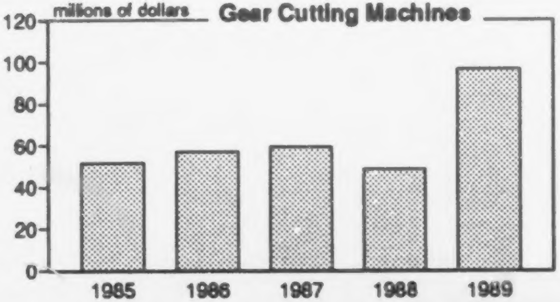
	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
Gear Cutting Machines	243	253	204	164	244	$51.8	$57.3	$59.6	$48.9	96.7
Gear Tooth Finishing Machines,[1]	164	253	204	164	244	34.6	57.3	59.6	48.9	96.7
Gear Hobbers–Horiz. and Vertical,[2]	79					17.2				

[1] Includes bevel gear generators. [2] Includes gear shapers.

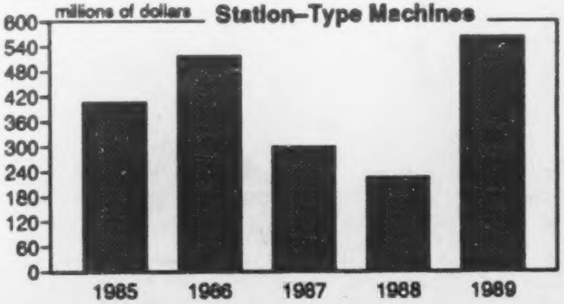
U.S. SHIPMENTS OF STATION–TYPE MACHINES

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
Station–Type Machines	531	641	434	283	525	$406.1	$517.7	$299.6	$225.4	$562.7
Dial or rotary, trunnion, & cen. column	239	298	287	188	291	45.3	132.1	125.3	85.3	152.6
Way type										
Transfer	192	213	94	63	234	290.1	322.8	144.6	128.4	410.2
Other Station Type	100	130	53	32		70.7	62.8	29.6	11.7	



Value of Shipments



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U.S. SHIPMENTS OF GRINDING AND POLISHING MACHINES

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
All Grinding and Polishing Machines	51,807	54,534	59,897	63,114	57,957	415.0	419.7	384.7	358.7	428.6
Unit Value Under $2,500	42,647	46,627	52,683	55,176	49,960	10.8	11.4	13.1	15.1	15.4
Unit Value $2,500 and Over	9,160	7,907	7,214	7,938	7,997	404.2	408.3	371.6	343.6	413.2
External Cylindrical Grinding Machines:										
Plain	93	77	78	85	116	21.4	21.7	20.1	21.2	37.3
Centerless Chucking All Other External, Roll	538	513	575	495	498	72.8	85.0	76.1	53.2	57.9
Universal	208	151	103	119	D	15.5	12.1	6.6	8.8	D
Internal Cylindrical Grinding Machines	D	D	D	D	D	D	D	D	D	D
Surface Grinding Machines:										
Rotary Table Type	117	84	71	65	280	17.0	16.4	16.6	13.0	22.7
Reciprocating Table Type:										
Vertical and Horizontal	1,031	619	421	686	650	20.5	16.5	13.3	20.6	21.0
Hand Surface Type	1,646	1,303	878	811	778	11.5	9.2	8.9	6.5	4.7
All other surface grinding machines	D	D	D	D	D	D	D	D	D	D
Disc Grinders, Double Spindle	D	D	D	D	D	D	D	D	D	D
All other Disc Grinders, bench, floor, snag grinders and abrasive belt grinders	407	322	320	265	260	5.0	8.4	12.1	7.5	7.8
Tool and Cutter Grinding Machines	1,333	1,439	782	981	1,001	55.2	58.6	43.5	57.7	70.1
All other grinding machines	697	613	980	1,116	1,054	42.1	29.3	28.7	43.0	42.3
Honing and Lapping Machines, internal, incl. combination bore, hone, and external	D	1,004	1,129	D	D	32.7	39.6	D	D	D
Flat surface lapping, except gear lapping	256	170	187	230	397	10.4	6.2	8.6	12.4	6.4
All other honing and lapping	D	D	D	D	D	D	D	D	D	D
Polishing stands, abrasive belt drum and disc	314	310	333	D	6.2	4.9	6.0	D	D	D
All other polishing and buffing machines, including speed lathes and multistation type	885	947	1,061	1,212	1,148	25.1	31.2	24.0	25.0	32.1

[1]Includes chucking grinders. [2]Included in "All Other." [3]This item includes items not disclosed, see footnote 2.

See graph next page.

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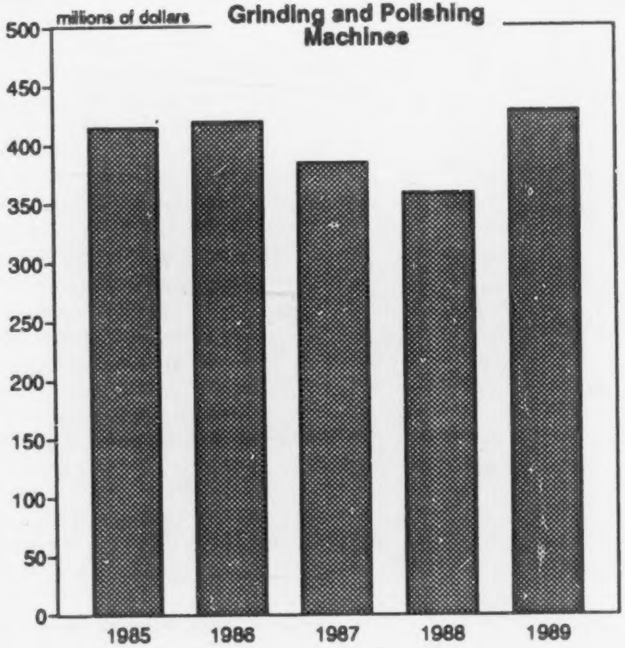
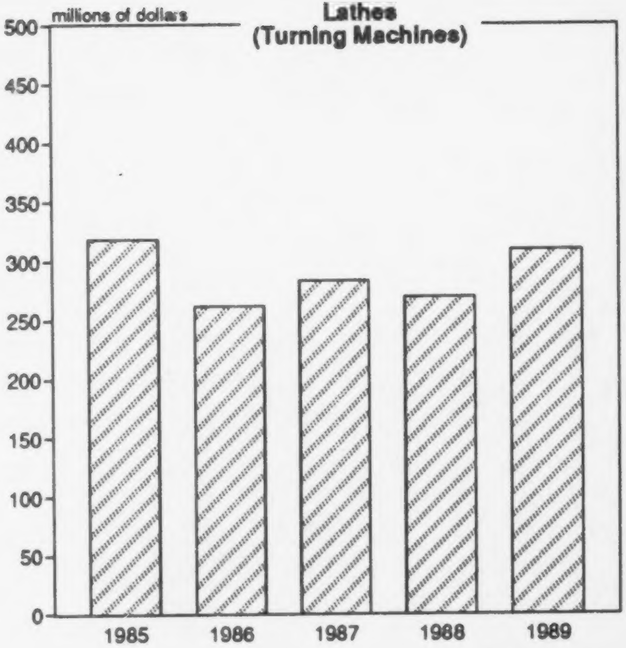
Value of Shipments





See Lathes table next page

U.S. SHIPMENTS OF LATHES

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
Lathes (or Turning Machines)	3,836	3,057	3,045	3,150	3,309	$318.7	$262.0	$283.5	$269.7	$306.6
Horizontal NC Turning Machines	1,344	1,071	1,530	1,669	1,534	189.7	143.6	183.1	181.6	189.0
Multiple Spindle	—	—	—	—	—	—	—	—	—	—
Single Spindle:										
Small	1,076	891	1,352	1,520	1,204	131.9	105.9	120.0	139.3	108.0
Medium	164	112	96	100	302	31.4	20.5	24.1	17.7	68.8
Large	104	68	82	49	28	26.4	17.1	38.9	24.6	12.2
Vertical NC Turning Machines	76	92	96	94	91	35.5	44.5	42.6	45.5	49.3
Vertical turret lathe and vertical boring machine over 30" diameter table	76	92	96	94	91	35.5	44.5	42.6	45.5	49.3
Vertical multiple spindle machines										
All other vertical turning machines										
Non–Numerically Controlled Turning Machines	2,416	1,894	1,419	1,387	1,684	93.5	73.9	57.9	43.5	67.4
All lathes valued at under $2,500	D	D	D	—	—	D	D	D	D	D
Engine or toolroom lathes swing over cross slide:										
8" or less	D	716	592	539	589	D	12.5	12.0	10.4	14.7
8"–16"	278					3.0				
Over 16"	D	152				D	6.9			
All other engine or toolroom lathes	D					D				
Automatic Lathes:										
Single Spindle	D	D	D	D	136	D	D	D	D	4.5
Multiple Spindle:										
Bar (screw) machines	231	169	D	D	D	28.4	18.8	D	D	D
Chucking machines	D	D	D	D	D	—	D	D	D	D
All other horizontal turning machines	D	D	311	261	302	D	D	17.4	6.8	8.8
Vertical turret lathes and vertical boring machines	D	—	D	—	—	D	—	D	—	—
All other vertical turning machines	D	D	D	D	D	D	D	D	D	D

[1] Includes "Over 8 inches to 16 inches" only. [2] Value less than $50,000.

See graph previous page.

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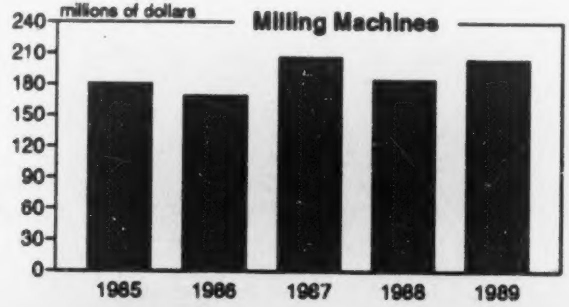
U. S. SHIPMENTS OF MILLING MACHINES

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
Milling Machines	8,308	8,133	6,277	7,717	6,831	$180.6	$169.2	$206.9	$184.5	$204.6
Milling Machines valued under $2,500	320$_E$	617$_E$	688$_E$	450$_E$	880$_E$	0.6$_E$	1.0$_E$	1.0$_E$	0.7$_E$	1.2$_E$
Milling Machines valued over $2,500	7,988$_E$	7,516$_E$	5,589$_E$	9,267$_E$	5,951$_E$	180.0$_E$	168.3$_E$	206.0$_E$	183.8$_E$	203.4$_E$
General Purpose, Knee or Bed:										
Horizontal, Plain, Universal, and Ram	D	D	D	D	D	D	D	D	D	D
Vertical, except Ram										
Vertical Ram										
All Other General Purpose Milling Machines										
Automatic and manufacturing:										
Single spindle	143	175	D	D	D	6.2	7.5	D	D	D
Multiple spindle and special purpose machines	D	D	437	D	D	D	D	19.6	D	D
Profile machines and duplicators	186	203	175	162	149	83.8	77.7	132.2	87.3	81.1
Die Sinking and engraving machines										
All Other Milling Machines										

Value of Shipments



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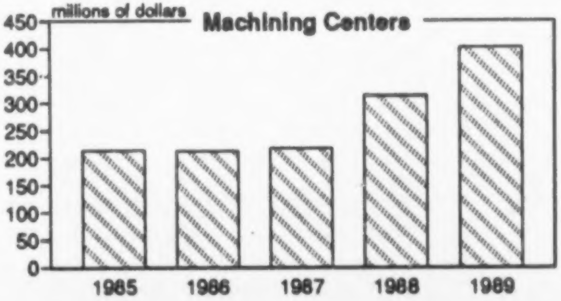
U.S. SHIPMENTS OF MACHINING CENTERS

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
Machining Centers	1,077	936	1,361	1,770	2,295	$214.7	$213.4	$217.8	$314.2	$402.8
Drill, Mill, and Bore (Manual Tool Change):										
Vertical	D	D	D	D	D	D	D	D	D	D
Horizontal	D	D	D	D	D	D	D	D	D	D
Drill, Mill, and Bore (Automatic Tool Change):										
Vertical:										
Y-axis Travel Less Than 20 Inches	341	296	272	363	407	30.8	26.0	22.7	31.0	31.6
Y-axis Travel 20 Inches to 26 Inches	224	181	329	484	926	32.0	25.1	37.2	56.8	95.6
Y-axis Travel Over 26 Inches	96	67	95	150	279	22.1	15.2	18.5	31.0	48.0
Horizontal:										
Y-axis Travel Less Than 27 Inches	143	D	D	D	280	37.2	D	D	D	78.8
Y-axis Travel 27 Inches to 40 Inches	} 139	59	D	D	D	} 70.4	22.5	D	D	D
Y-axis Travel Over 40 Inches		94	84	73	103		66.3	57.9	53.1	76.1
Machining Centers with automatic multiple spindle head changing capability	D	D	D	D	D	D	D	D	D	D
All other machining centers	D	D	D	D	D	D	D	D	D	D

Value of Shipments



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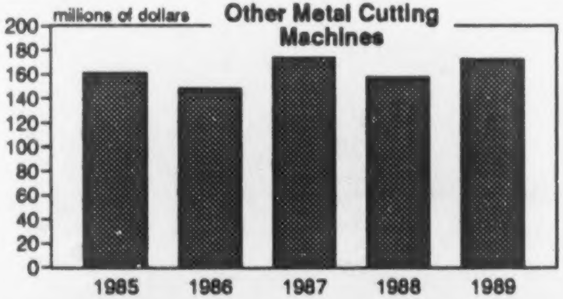
U.S. SHIPMENTS OF OTHER METAL CUTTING MACHINE TOOLS

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
Other Metal Cutting Machine Tools	17,741	13,496	13,785	17,711	18,884	161.5	148.4	173.9	157.8	172.6
Other Metal Cutting valued under $2,500	11,009	7,882	8,020	10,828	11,297	10.3	8.8	8.5	11.8	11.8
Other Metal Cutting valued over $2,500	6,732	5,614	5,765	6,883	7,587	151.3	139.6	165.4	146.0	160.8
Broaching Machines	144	126	94	63	83	18.9	22.8	11.1	7.8	10.2
Sawing and Cutoff Machines:										
Power hack saws	124	137	104	84	76	0.9	1.2	1.3	1.0	1.1
Circular Cutoff Saws (Cold)	168	D	D	D	D	6.1	D	D	D	D
Abrasive Wheel Saws		D	D	D	D		D	D	D	D
Band Saws	3,488	2,719	2,904	3,862	4,580	35.3	27.6	26.1	35.3	43.7
All other sawing and cutoff machines	747	615	558	617	D	19.2	15.9	15.3	20.9	D
Tapping Machines	206	D	D	D	D	15.3	D	D	D	D
Spark Erosion, ultrasonic, and electrolytic machines:										
Electrical Discharge Machines	1,027	938	660	626	562	32.1	33.2	24.8	26.3	25.1
Travelling Wire EDM										
Electrochemical Machine										
All other spark erosion, ultrasonic and electrolytic machine										
Miscellaneous Metal Cutting Machine Tools	828	720	758	1,351	1,219	23.4	28.7	25.2	35.3	38.9

Value of Shipments



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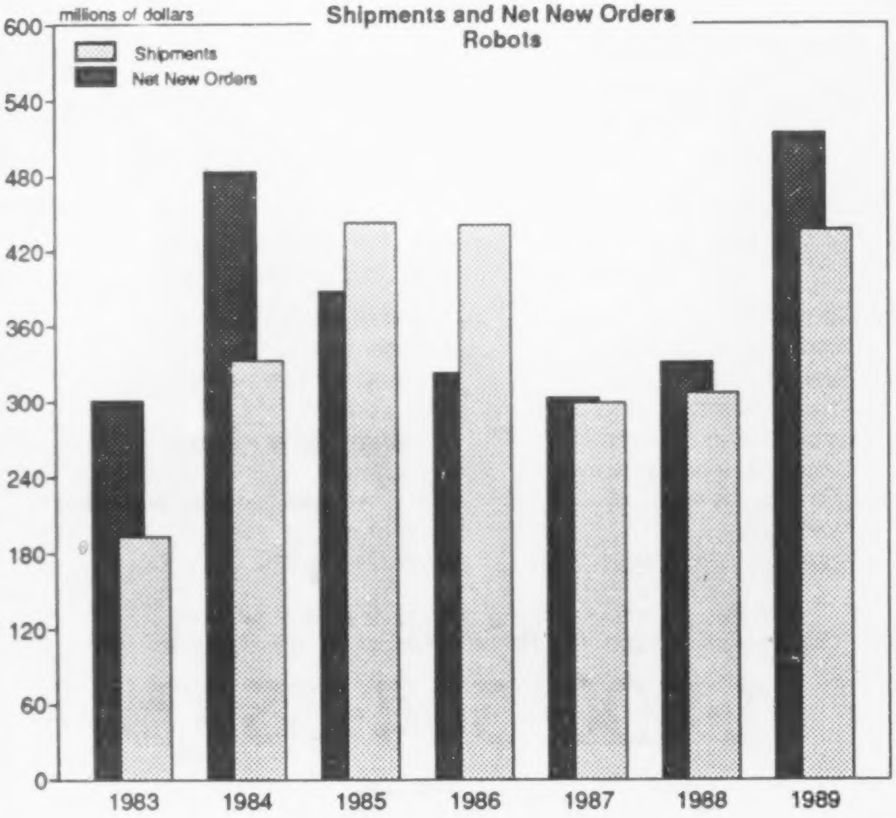
SHIPMENTS AND NET NEW ORDERS OF ROBOTS

1983 – 1989

(in millions of dollars)

Year	Shipments	Net New Orders
1983	$194	$301
1984	333	484
1985	443	388
1986	441	323
1987	299	303
1988	307	331
1989	437	514

Source: Robotics Industries Association



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Section Note:
Source for all data in section C: U.S. Department of Commerce, Import data – "Census Report IM146;" Export data – "Census Report EM522," prepared by NMTBA.

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LEADING SOURCES OF U.S. IMPORTS

(in millions of dollars)

All Machine Tools

Country of Origin	1985	1986	1987	1988	1989
World Total	$1,738.5	$2,251.8	$1,995.4	$2,058.7	$2,406.6
Japan	854.1	1,173.6	1,061.2	1,112.5	1,337.2
Germany, Fed. Rep.	248.9	367.9	332.0	277.5	338.7
Taiwan	134.2	119.3	127.5	135.5	141.5
Switzerland	95.2	115.3	103.6	94.9	104.5
United Kingdom	93.5	100.7	85.4	105.8	97.5
Italy	76.6	129.8	72.4	76.6	79.9
Canada	61.2	52.9	49.2	56.6	71.5
Korea, Rep. of	9.0	10.9	14.7	14.9	28.3
Belgium	10.3	12.7	9.4	18.8	28.2
Sweden	29.0	22.6	23.6	25.8	24.5
France	19.2	36.9	17.6	17.0	23.8
Spain	19.8	23.1	16.5	22.1	22.6
Singapore	15.9	7.3	9.3	12.1	18.8
Brazil	21.5	19.2	7.3	29.6	11.9
All Others	50.1	59.6	65.7	59.0	78.0

Metal Cutting Machine Tools

Country of Origin	1985	1986	1987	1988	1989
World Total	$1,374.7	$1,654.6	$1,435.9	$1,543.3	$1,859.1
Japan	721.4	841.8	721.3	839.2	1,042.6
Germany, Fed. Rep.	186.7	279.6	268.0	228.1	271.2
Taiwan	130.4	116.1	123.0	128.8	132.1
Switzerland	76.3	96.6	81.1	76.4	87.0
United Kingdom	67.1	77.4	68.7	88.7	80.7
Italy	45.3	92.3	45.6	43.0	52.1
Korea, Rep. of	8.9	10.8	14.3	14.4	27.7
France	12.7	27.3	13.8	12.4	22.0
Canada	30.4	23.3	19.1	19.3	20.8
Spain	17.9	19.4	14.2	18.1	19.5
Singapore	15.6	6.9	7.5	10.6	17.9
Sweden	15.3	11.0	16.3	10.3	13.6
Brazil	7.7	4.2	2.3	6.3	7.4
Belgium	3.4	3.0	1.5	3.0	5.5
All Others	35.6	44.9	39.2	44.7	59.0

Metal Forming Machine Tools

Country of Origin	1985	1986	1987	1988	1989
World Total	$363.8	$597.2	$559.5	$515.4	$547.6
Japan	132.7	331.8	339.9	273.2	294.5
Germany, Fed. Rep.	62.2	88.3	63.9	49.3	67.5
Canada	30.8	29.6	30.1	37.4	50.6
Italy	31.3	37.5	26.8	33.5	27.8
Belgium	6.9	9.8	7.9	15.8	22.7
Switzerland	18.9	18.7	22.6	18.5	17.5
United Kingdom	26.5	23.3	16.7	17.1	16.8
Sweden	13.7	11.6	7.3	15.5	10.9
Taiwan	3.9	3.1	4.5	6.7	9.3
Brazil	13.9	15.0	4.9	23.3	4.5
Spain	1.9	3.7	2.3	4.0	3.1
France	6.5	9.6	3.8	4.6	1.8
Singapore	0.3	0.4	1.8	1.6	0.9
Korea, Rep of	0.1	0.1	0.4	0.5	0.6
All Others	14.2	14.7	26.6	14.4	19.1

U.S. SHIPMENTS OF PUNCHING, SHEARING, BENDING, AND FORMING MACHINES

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
Punching, Shearing, Bending, and Forming	33,164	25,541	25,274	25,830	21,939	$322.5	$292.1	$315.3	$372.3	$418.2
Punching and Shearing										
Valued less than $2,500	6,647	4,794	3,287	4,292	3,628	6.7	4.7	4.3	5.0	4.6
Punches, including combination punching and shearing	1,667	1,551	1,6[illegible]4	1,985	1,864	15.7	13.8	16.8	21.6	28.0
Punching machines fixed position and two axis positioning table	327	444	394	507	517	49.4	50.0	61.7	75.9	82.8
Plate Shearing Machines:										
Mechanical	581	382	344	422	532	45.1	24.1	31.4	33.8	46.7
Hydraulic	563	554	771	877	966	15.2	11.3	13.9	13.9	17.8
Bar, angle, and rotary shearing machines	99	94	118	106	98	0.7	1.0	2.5	1.1	1.5
Other power operated punching and shearing machines	311	402	207	256	263	11.3	17.4	11.4	16.0	17.6
Bending and Forming valued less than $2,500	15,927	9,736	11,534	10,591	7,240	11.7	7.8	10.8	8.9	6.9
Press Brakes:										
Mechanical	1,035	78	74	122	D	10.4	7.6	3.3	3.8	D
Hydraulic	641	615	657	842	819	29.0	29.3	30.9	43.2	49.8
Hydromechanical	D	147	134	D	D	D	3.9	3.9	D	D
Bending rolls, sheet, and plate	301	281	360	448	508	8.5	6.0	6.4	21.7	25.9
Bending rolls, angles, bars, shapes and tubes	D	D	D	D	D	D	D	D	D	D
Rotary bending and forming machines, including rotary head	1,979	1,893	2,229	2,239	2,154	30.8	27.3	26.1	27.4	26.6
Ram and press bending machines	D	D	D	D	D	D	D	D	D	D
Other bending and forming machines, incl. folders	2,450	3,191	2,984	2,523	2,668	60.2	63.6	67.6	70.1	84.0

See graph next page.

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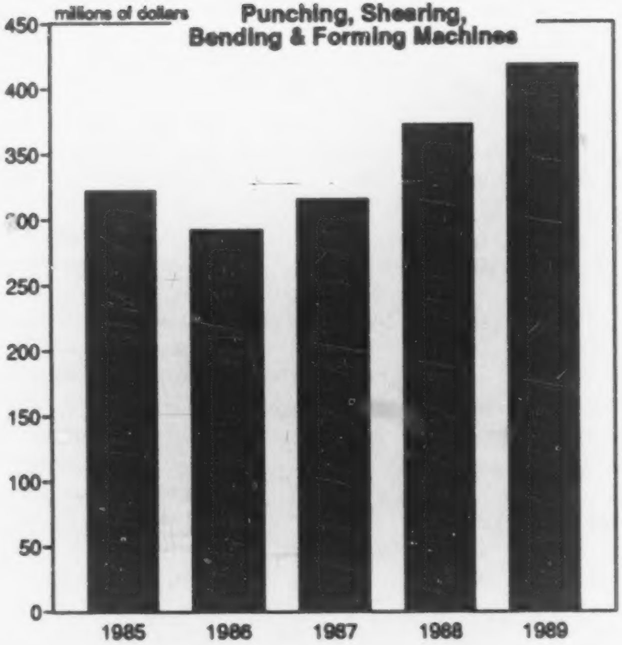
Value of Shipments



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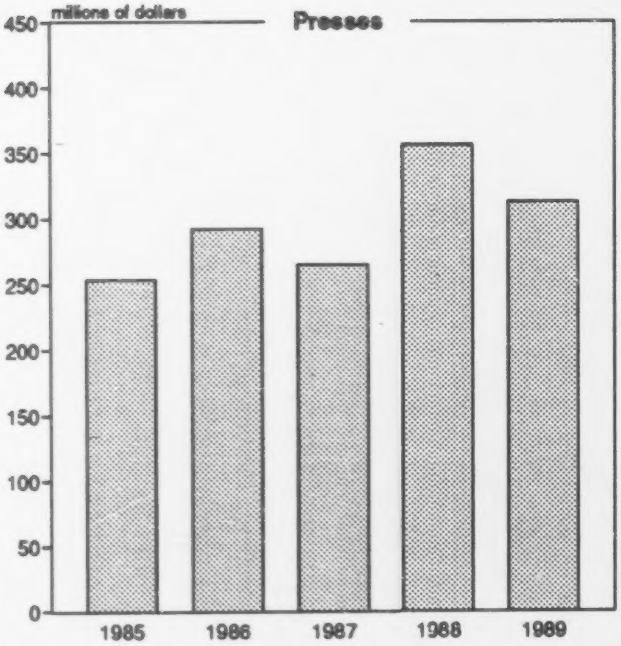

U.S. SHIPMENTS OF PRESSES

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	19[illegible]	1986	1987(r)	1988(r)	1989(p)
Presses	9,137	9,439	8,134	9,593	9,007	$254.0	$293.1	$265.6	$356.5	$313.4
All presses valued under $2,500	6,526	6,754	5,585	6,572	5,520	4.1	5.0	4.0	5.3	3.4
Mechanical presses:										
Open back inclinable, gap type:										
50 tons and under	570	430	423	449	457	9.7	8.2	4.7	6.6	6.8
51 tons to 120 tons	} 243	205	151	194	202	} 14.1	13.2	7.3	11.6	11.6
121 tons and over		61	59	14	D		3.0	2.8	1.0	D
Vertical straight side and arch frame single action:										
Single point	} 176	D	D	D	D	} 50.9	D	D	D	D
Two point 300 tons and under		} 72	61	68	85		} 12.4	15.0	13.1	18.7
Two point 301 tons and over										
Gap and horn type	67	37	36	D	D	4.7	3.7	4.0	D	D
Automatic presses, strip or coil field	340	241	331	409	431	59.5	47.0	52.0	56.9	70.9
All other mechanical presses	120	138	62	176	D	52.9	79.5	76.7	174.6	D
Vertical Single Action, all tonnages:										
Housing or Straight Side Type	44	55	14	30	15	9.6	11.1	4.3	7.4	3.4
Column and Open Rod Type	236	95	113	84	D	9.3	5.8	10.8	10.4	D
Gap or C–Frame:										
15 Tons and Under	83	438	472	571	469	2.2	3.4	3.7	5.5	3.8
16–35 Tons	55	48	D	65	55	1.6	2.0	D	2.4	2.3
Over 35 Tons	62	63	D	59	80	4.1	4.4	D	6.9	6.8
Vertical double action 2 –slide type – all tonnages	—	D	D	D	D	—	D	D	D	D
Extrusion Presses, all types	} 615	D	D	D	D	} 31.4	D	D	D	D
Other hydraulic & pneumatic presses,incl. horiz.		699	594	782	1,236		17.2	24.0	21.8	27.5

[1]Unit value $2,500 or over.

See graph previous page

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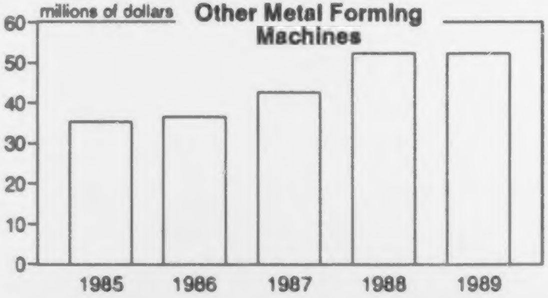
U.S. SHIPMENTS OF FORGING AND OTHER METAL FORMING MACHINE TOOLS

(values in millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987(r)	1988(r)	1989(p)	1985	1986	1987(r)	1988(r)	1989(p)
Forging Machines	213	179	184	225_E	227_E	$35.4	$36.7	$42.7	52.5_E	52.5_E
Headers and upsetters Swaging Machines Forging presses (die stamping presses) All other forging machines	213	179	184	225_E	227_E	35.4	36.7	42.7	52.5_E	52.5_E
All other metal forming machine tools	10,831	10,761	14,817	19,833	15,826	193.1	176.3	264.2	394.6	315.2
All other metal forming machine tools valued at less than $2,500	5,562	5,724	10,424	13,254	9,719	5.7	5.5	5.6	7.6	8.2
Thread rolling machinery	245	308	297	400	322	18.6	20.4	9.7	9.6	16.2
Metal container–making machinery	707	765	1,300	1,569	1,590	41.0	51.1	140.0	168.4	134.7
Die casting machines:										
200 tons and under 201 tons to 500 tons 501 tons to 700 tons 701 tons and over	167	139	180	185	123	44.9	35.3	49.5	58.0	81.3
Riveting machines	1,972	2,018	1,096	2,193	1,890	26.1	19.1	15.3	24.0	20.5
All other metal forming type machine tools[2]	2,178	1,807	1,520	2,232	2,182	56.6	44.8	44.1	126.9	54.3

[1]Unit value $2,500 or over. [2]Not elsewhere classified.

Value of Shipments



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LEADING U.S. EXPORT MARKETS

All Machine Tools

(in millions of dollars)

Country of Destination	1985	1986	1987	1988	1989
World Total	$452.4	$590.3	$650.4	$768.3	$949.8
Canada	82.0	85.0	98.5	108.7	110.8
Mexico	63.8	93.9	89.0	126.8	107.3
United Kingdom	31.2	43.3	24.9	57.7	99.9
Korea, Rep. of	14.9	31.4	85.9	73.2	98.6
Japan	36.2	52.1	55.4	64.1	78.1
Germany, Fed. Rep.	23.1	37.0	32.0	40.4	61.5
China	26.6	50.5	42.5	37.4	40.8
Taiwan	6.6	11.7	12.0	25.6	32.2
Italy	11.2	16.8	16.0	21.3	24.6
France	6.7	10.6	12.2	16.8	22.4
USSR	1.2	1.3	3.2	1.3	21.9
Brazil	24.6	16.5	24.9	21.0	21.2
India	6.6	9.9	5.7	10.7	20.5
Australia	14.6	8.1	11.4	14.3	18.2
Singapore	12.4	8.1	10.0	9.3	16.1
Venezuela	7.0	6.5	13.6	25.2	14.0
Belgium	2.3	23.5	12.6	7.6	12.4
Netherlands	2.9	3.5	4.6	7.4	11.5
Spain	3.7	3.2	2.8	7.2	7.4
Thailand	1.6	0.3	1.8	5.7	6.5
Switzerland	3.6	6.4	5.7	4.7	5.6
Indonesia	3.2	1.5	1.7	0.9	4.4
Malaysia	3.2	0.7	1.9	3.6	2.6
Austria	0.7	1.1	17.2	1.3	2.1
All Others	62.5	67.4	64.9	76.1	109.2

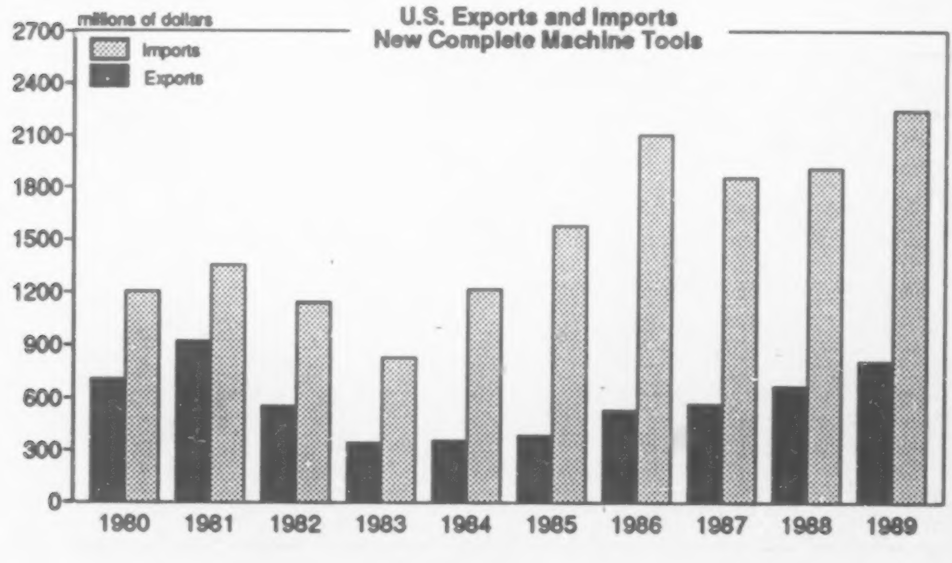
Metal Cutting Machine Tools

Country of Destination	1985	1986	1987	1988	1989
World Total	$285.9	$371.3	$383.5	$443.7	$488.8
Canada	49.3	43.6	60.5	61.5	68.4
Mexico	40.3	63.8	54.9	89.0	60.2
United Kingdom	19.9	35.8	15.0	32.4	60.2
Korea, Rep. of	9.8	19.2	44.3	48.2	36.0
Germany, Fed. Rep.	12.1	20.9	19.5	17.8	31.3
Japan	20.1	35.8	29.3	30.0	30.7
China	21.7	34.8	22.1	27.1	29.1
USSR	0.4	1.0	2.1	1.2	20.9
Italy	8.9	6.7	10.5	13.1	14.8
Brazil	20.9	4.3	15.6	10.7	11.8
France	3.6	4.6	5.8	7.6	11.8
India	4.4	7.7	4.5	8.3	11.6
Australia	4.0	3.9	5.9	3.6	11.2
Taiwan	3.8	4.1	7.5	13.0	9.6
Singapore	7.4	5.1	5.2	6.8	7.9
Belgium	1.4	20.9	11.5	6.1	7.6
Venezuela	5.5	3.6	5.7	15.2	5.5
Netherlands	1.7	2.4	1.8	2.9	4.6
Indonesia	3.1	1.5	1.0	0.4	4.2
Switzerland	2.6	4.9	3.9	2.9	4.0
Spain	3.0	2.0	1.1	2.1	3.2
Thailand	0.4	0.2	0.3	1.2	2.6
Austria	0.6	0.4	16.9	0.8	1.3
Malaysia	2.1	0.2	0.4	0.5	1.0
All Others	38.9	33.9	38.2	41.3	39.3

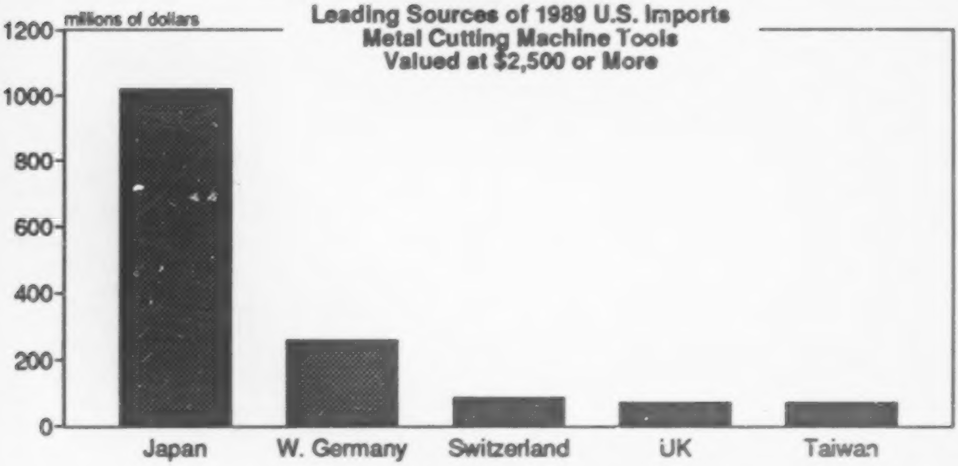
LEADING U.S. EXPORT MARKETS
Metal Forming Machine Tools
(in millions of dollars)

Country of Destination	1985	1986	1987	1988	1989
World Total	$166.5	$219.1	$266.9	$324.6	$461.0
Korea, Rep. of	5.1	12.2	41.5	25.0	62.6
Japan	16.1	16.4	26.1	34.2	47.5
Mexico	20.5	30.1	34.1	37.9	47.0
Canada	32.7	41.4	38.0	47.2	42.4
United Kingdom	11.3	7.5	10.0	25.4	39.7
Germany, Fed. Rep. of	10.9	16.1	12.5	22.6	30.2
Taiwan	2.8	7.6	4.5	12.6	22.6
China	4.9	15.7	20.4	10.3	11.7
France	3.1	6.1	6.4	9.2	10.6
Italy	2.3	10.1	5.4	8.1	9.9
Brazil	3.8	2.3	9.3	10.3	9.4
India	2.2	2.2	1.2	2.3	8.9
Venezuela	1.5	2.9	8.0	10.0	8.4
Singapore	5.0	3.0	4.8	2.5	8.2
Australia	10.6	4.3	5.5	10.7	7.1
Netherlands	1.2	1.1	2.8	4.6	6.9
Belgium	0.9	2.6	1.1	1.5	4.8
Spain	0.7	1.2	1.7	5.2	4.3
Thailand	1.2	0.1	1.4	4.5	3.9
Malaysia	1.1	0.5	1.5	3.1	1.8
Switzerland	1.0	1.5	1.8	1.7	1.5
USSR	0.7	0.2	1.0	0.1	1.0
Austria	A	0.7	0.3	0.5	0.8
Indonesia	A	A	0.7	0.5	0.2
All Others	23.9	33.3	26.9	34.6	69.8

A — Less than $50,000.



U.S. IMPORTS



Leading Sources of 1989 U.S. Imports
Metal Cutting Machine Tools
Valued at $2,500 or More

New, Complete Metal Cutting Machine Tools Valued at $2,500 or More

(in millions of dollars)

Country of Origin	1985	1986	1987	1988	1989
TOTAL	$1,235.2	$1,526.8	$1,317.0	$1,415.1	$1,723.0
EUROPE	na	na	na	na	545.0
Austria	4.7	4.8	7.4	7.3	8.1
Belgium	3.1	2.5	1.3	2.6	2.4
France	10.4	24.7	10.9	10.1	21.1
Germany, Fed. Rep.	170.2	258.7	257.3	221.2	257.9
Italy	42.7	88.6	41.0	39.5	45.2
Netherlands	6.3	15.7	5.7	5.8	4.7
Spain	16.7	17.5	13.8	17.6	19.5
Sweden	14.0	9.3	14.7	8.3	10.3
Switzerland	74.2	95.4	79.1	74.9	85.9
United Kingdom	55.7	69.7	63.1	83.3	71.8
Other	na	na	na	na	18.1
NORTH AND CENTRAL AMERICA	na	na	na	na	18.9
Canada	21.5	18.5	15.4	15.7	18.8
Other	na	na	na	na	0.1
SOUTH AMERICA	na	na	na	na	7.6
Brazil	7.2	3.9	2.3	6.1	7.4
Other	na	na	na	na	0.2
ASIA	na	na	na	na	1,149.4
China	2.0	2.6	2.6	4.4	9.3
Israel	2.6	2.0	1.3	2.7	5.2
Japan	706.5	818.5	708.0	815.9	1,019.2
Korea, Rep. of	7.6	10.3	13.8	14.1	25.1
Singapore	13.8	6.8	5.8	10.5	17.9
Taiwan	63.0	64.2	59.8	60.2	71.1
Other	na	na	na	na	1.6
OTHER	na	na	na	na	2.1

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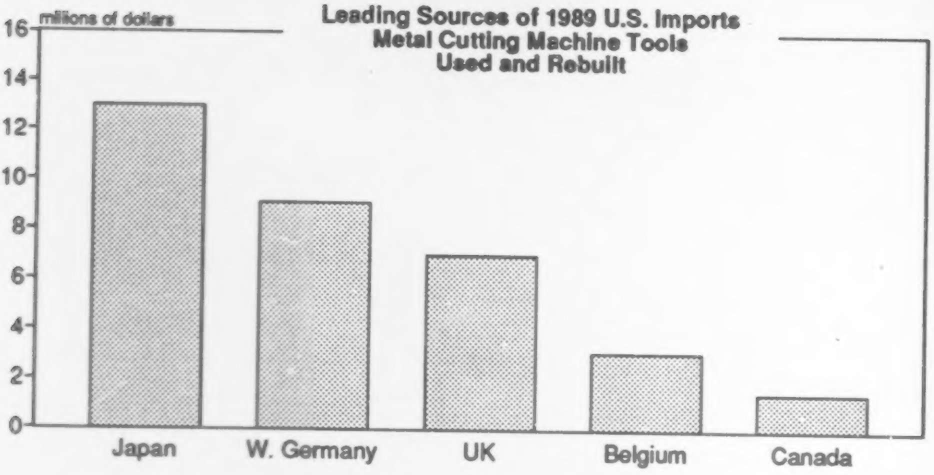
E – estimated by NMTBA, D – not disclosed, N.E.C – not elsewhere classified

U.S. IMPORTS



Leading Sources of 1989 U.S. Imports
Metal Cutting Machine Tools
Used and Rebuilt

Metal Cutting Machine Tools
Used and Rebuilt

(in millions of dollars)

Country of Origin	1985	1986	1987	1988	1989
TOTAL	$42.5	$26.8	$19.8	$21.0	$38.6
EUROPE	na	na	na	na	22.4
Belgium	0.1	0.1	0.1	0.4	3.1
France	0.3	0.8	0.3	0.1	0.1
Germany, Fed. Rep.	8.4	5.1	5.3	4.1	9.1
Italy	0.6	1.9	1.8.	0.8	0.6
Sweden	0.1	0.2	0.2	0.1	1.1
Switzerland	1.1	0.7	1.6	1.0	0.9
United Kingdom	9.2	5.0	2.6	2.9	7.0
Other	na	na	na	na	0.5
NORTH AND CENTRAL AMERICA	na	na	na	na	1.6
Canada	6.1	2.0	0.9	1.2	1.5
Other	na	na	na	na	0.1
ASIA	na	na	na	na	14.5
Japan	2.7	2.3	3.2	8.4	13.0
Taiwan	9.7	5.3	2.4	0.6	1.0
Other	na	na	na	na	0.5
OTHER	na	na	na	na	0.1

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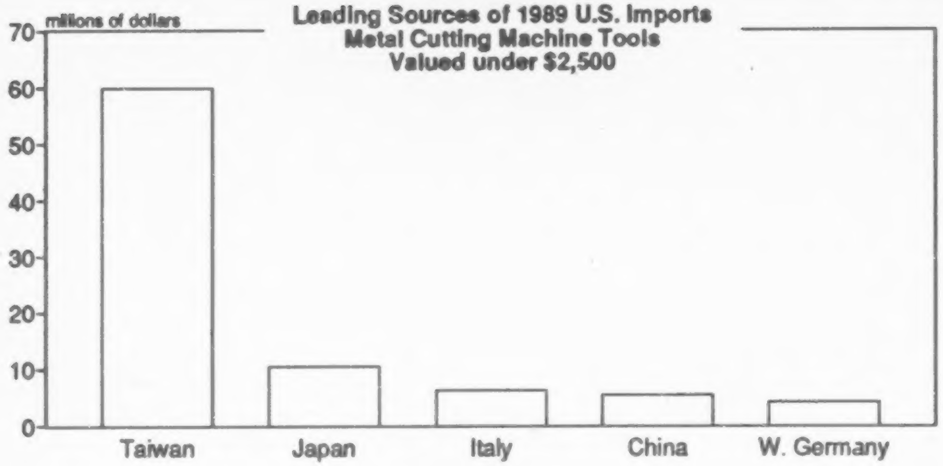

Metal Cutting Machine Tools
Valued Under $2,500

(in millions of dollars)

Country of Origin	1985	1986	1987	1988	1989
TOTAL	$97.1	$101.0	$99.1	$107.2	$97.5
EUROPE	na	na	na	na	18.0
Austria	1.0	1.5	1.8	1.5	0.5
France	1.9	1.8	2.6	2.3	0.7
Germany, Fed. Rep.	8.2	15.8	5.5	2.9	4.2
Italy	1.9	1.9	2.7	2.7	6.3
Netherlands	0.6	1.3	0.7	1.2	0.7
Sweden	1.1	1.5	1.5	2.0	2.3
Switzerland	0.9	0.5	0.4	0.5	0.2
United Kingdom	2.2	2.8	3.1	2.4	1.9
Other	na	na	na	na	1.2
NORTH AND CENTRAL AMERICA	na	na	na	na	0.7
Canada	2.8	2.8	2.8	2.3	0.5
Other	na	na	na	na	0.2
ASIA	na	na	na	na	78.5
China	0.4	0.5	0.5	3.0	5.4
Japan	12.2	20.9	10.1	15.0	10.5
Korea, Rep. of	0.6	0.4	0.4	0.3	2.3
Taiwan	57.7	46.7	60.8	68.0	60.0
Other	na	na	na	na	0.3
OTHER	na	na	na	na	0.3

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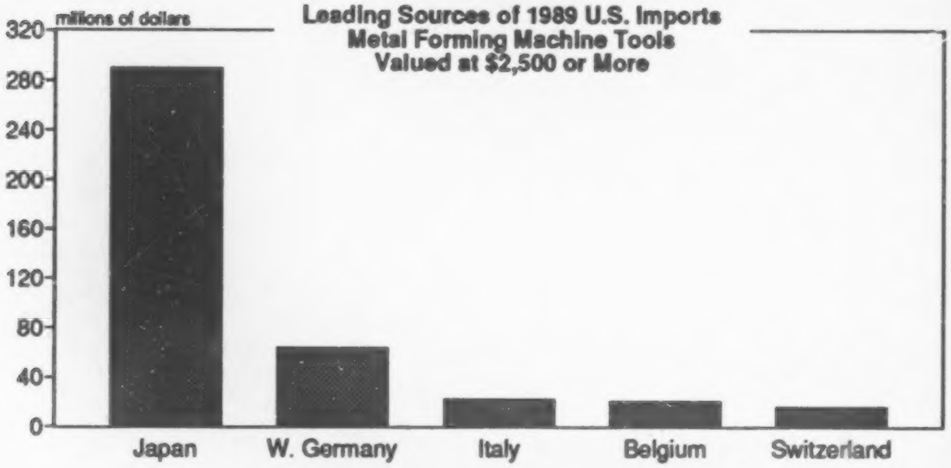
U.S. IMPORTS



New, Complete Metal Forming Machine Tools Valued at $2,500 or More

(in millions of dollars)

Country of Origin	1985	1986	1987	1988	1989
TOTAL	$347.2	$579.2	$543.1	$496.4	$523.3
EUROPE	na	na	na	na	169.9
Austria	1.2	0.8	7.0	0.3	1.4
Belgium	6.9	9.6	7.8	15.5	20.9
France	5.6	9.0	3.5	3.8	1.6
Germany, Fed. Rep.	59.3	85.2	60.8	46.4	64.0
Italy	30.0	34.5	25.6	33.1	26.2
Netherlands	3.6	2.2	2.6	3.9	2.4
Spain	1.9	3.7	2.1	3.7	2.6
Sweden	13.1	11.2	6.9	15.3	10.3
Switzerland	17.6	17.9	21.8	18.0	16.5
United Kingdom	24.3	22.2	15.7	16.6	14.5
Other	na	na	na	na	9.5
NORTH AND CENTRAL AMERICA	na	na	na	na	49.1
Canada	30.1	26.7	28.5	34.8	48.1
Other	na	na	na	na	1.0
SOUTH AMERICA	na	na	na	na	4.5
Brazil	13.9	14.9	4.9	23.3	4.4
Other	na	na	na	na	0.1
ASIA	na	na	na	na	299.1
Israel	1.1	1.1	2.3	1.0	0.9
Japan	130.3	327.6	335.3	269.9	289.9
Taiwan	1.6	1.2	2.3	3.7	6.8
Other	na	na	na	na	1.7
OTHER	na	na	na	na	0.7

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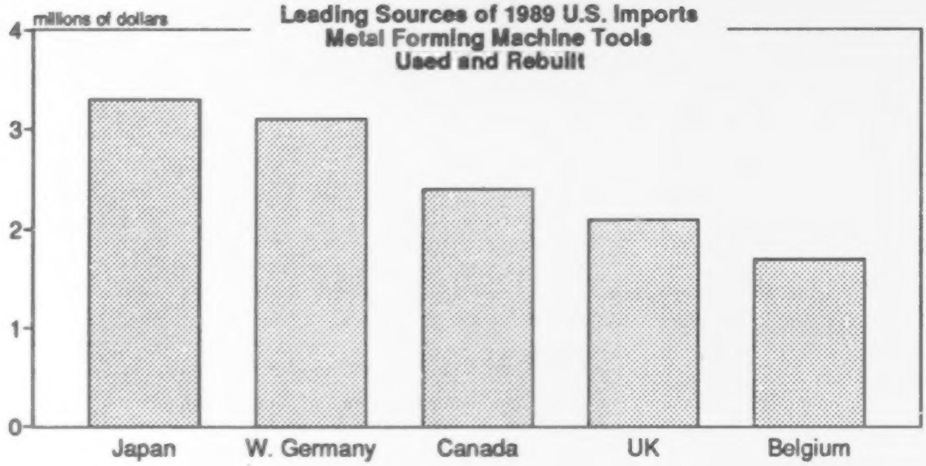
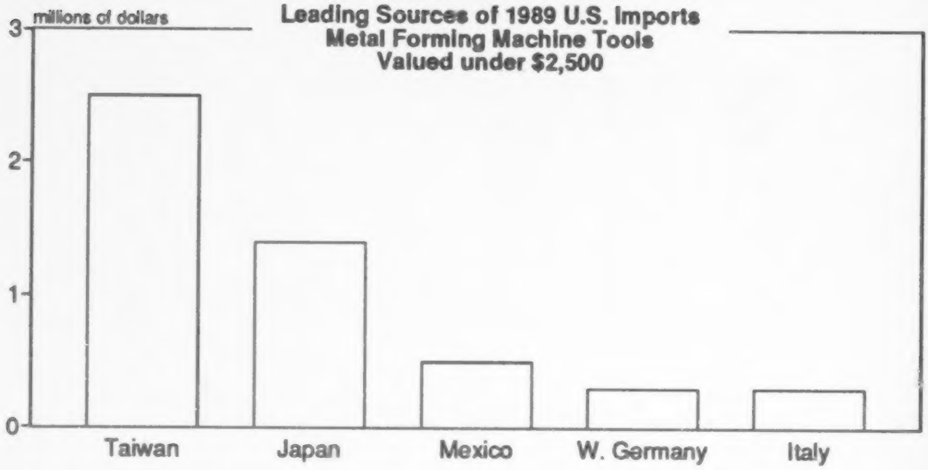


Metal Forming Machine Tools
Used and Rebuilt

(in millions of dollars)

Country of Origin	1985	1986	1987	1988	1989
TOTAL	$7.4	$7.9	$6.7	$5.7	$17.5
EUROPE	na	na	na	na	10.7
Belgium	A	A	A	0.2	1.7
Germany, Fed. Rep.	1.6	0.9	0.9	0.6	3.1
Italy	0.5	2.1	0.5	A	1.4
Switzerland	0.9	0.5	0.4	0.2	0.8
United Kingdom	1.7	0.7	0.5	0.4	2.1
Other	na	na	na	na	1.6
NORTH AND CENTRAL AMERICA	na	na	na	na	2.7
Canada	0.5	0.7	1.3	2.2	2.4
Other	na	na	na	na	0.3
ASIA	na	na	na	na	3.8
Japan	1.0	2.4	2.7	1.1	3.3
Other	na	na	na	na	0.5
OTHER	na	na	na	na	0.3

A — Less than $50,000.



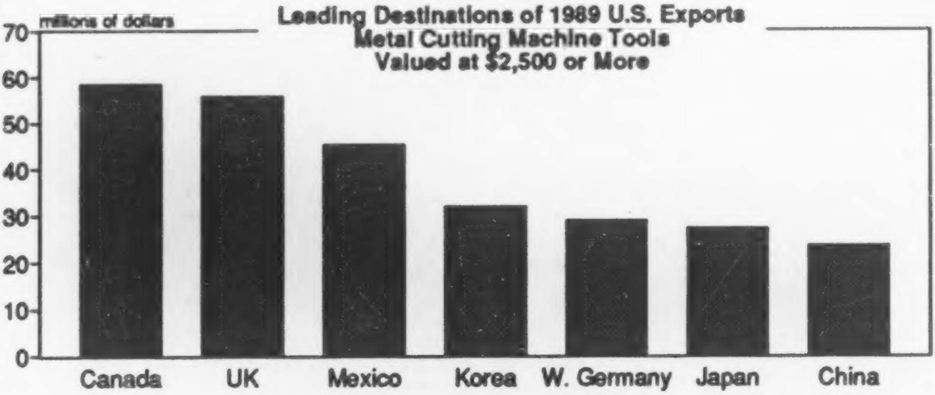
Metal Forming Machine Tools Valued Under $2,500

(in millions of dollars)

Country of Origin	1985	1986	1987	1988	1989
TOTAL	$9.2	$10.1	$9.7	$11.3	$6.8
EUROPE	na	na	na	na	1.7
France	0.7	0.4	0.3	0.7	A
Germany, Fed. Rep.	1.4	2.2	2.2	2.3	0.3
Italy	0.9	0.9	0.6	0.4	0.3
Sweden	0.3	0.3	0.3	0.2	0.1
Switzerland	0.3	0.3	0.3	0.2	0.2
United Kingdom	0.5	0.4	0.5	0.1	0.1
Other	na	na	na	na	0.7
NORTH AND CENTRAL AMERICA	na	na	na	na	0.7
Canada	0.2	0.3	0.3	0.4	0.2
Mexico	na	na	na	na	0.5
Other	na	na	na	na	A
ASIA	na	na	na	na	4.3
Japan	1.4	1.8	1.9	2.2	1.4
Taiwan	2.0	1.9	2.2	2.9	2.5
Other	na	na	na	na	0.4
OTHER	na	na	na	na	0.1

A — Less than $50,000.

U.S. EXPORTS


Leading Destinations of 1989 U.S. Exports
Metal Cutting Machine Tools
Valued at $2,500 or More

New, Complete Metal Cutting Machine Tools
Valued at $2,500 or More

(in millions of dollars)

Country of Destination	1985	1986	1987	1988	1989
TOTAL	$232.8	$322.1	$324.3	$366.7	$419.9
EUROPE	51.2	103.2	93.0	89.0	158.4
Belgium	0.7	20.0	10.7	5.1	7.2
France	3.2	3.0	3.6	6.4	10.7
Germany, Fed. Rep.	11.1	19.1	17.4	16.1	28.9
Italy	3.4	4.9	9.4	10.5	11.4
Netherlands	1.5	1.0	1.5	2.3	3.8
Spain	3.0	1.6	0.9	1.8	2.9
Sweden	3.1	2.7	3.0	1.2	2.3
Switzerland	1.6	4.2	3.3	2.5	3.8
Turkey	2.2	8.8	5.2	4.0	2.2
United Kingdom	17.0	33.9	11.9	26.2	55.9
USSR	0.4	1.0	2.1	1.1	20.9
Other	4.0	3.0	24.0	11.8	8.4
NORTH AND CENTRAL AMERICA	69.8	89.8	95.0	122.3	105.8
Canada	40.8	36.3	51.3	51.4	58.6
Mexico	27.3	52.3	42.3	70.1	45.4
Other	1.7	1.2	1.4	0.8	1.8
SOUTH AMERICA	28.7	18.3	22.2	23.2	19.3
Brazil	20.5	13.6	14.7	9.8	10.2
Venezuela	5.0	1.3	2.6	9.1	4.1
Other	3.2	3.4	4.9	4.3	5.9
ASIA	76.3	106.6	108.3	127.5	124.7
China	21.1	34.4	20.1	23.6	23.6
Hong Kong	2.3	1.7	1.9	2.3	2.8
India	4.1	5.7	4.4	7.7	10.5
Indonesia	na	na	1.0	0.2	4.0
Israel	3.4	1.9	1.6	3.5	1.7
Japan	18.7	32.1	27.2	27.5	27.3
Korea, Rep. of	9.4	18.7	40.9	41.4	32.0
Singapore	6.0	3.4	2.9	5.4	5.5
Taiwan	2.6	3.4	6.7	12.4	8.6
Thailand	na	na	na	na	1.9
Other	8.7	5.3	1.6	3.5	6.8
OCEANIA	3.9	2.9	4.7	2.5	9.4
Australia	3.4	2.5	4.5	2.4	9.0
Other	0.5	0.4	0.2	0.1	0.4
AFRICA	3.0	1.3	0.9	2.2	2.3

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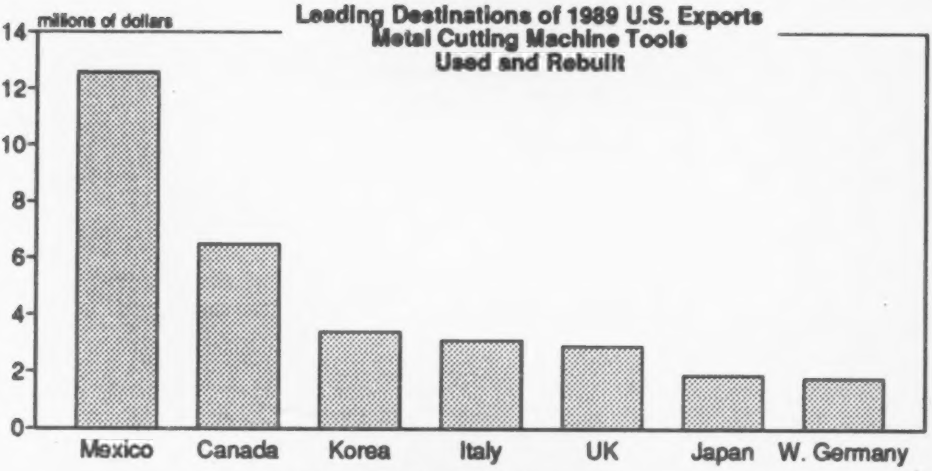


Leading Destinations of 1989 U.S. Exports
Metal Cutting Machine Tools
Used and Rebuilt

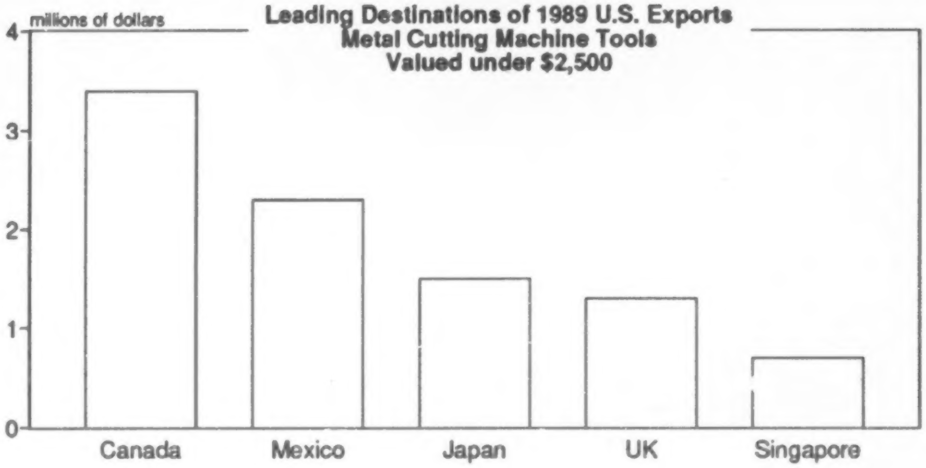
Metal Cutting Machine Tools
Used and Rebuilt

(in millions of dollars)

Country of Destination	1985	1986	1987	1988	1989
TOTAL	$43.4	$36.1	$44.6	$60.6	$53.9
EUROPE	16.7	10.5	12.1	13.1	10.7
Belgium	0.4	0.3	0.2	0.8	0.4
France	0.4	1.2	2.1	1.0	0.9
Germany, Fed. Rep.	0.5	1.1	1.3	0.7	1.8
Italy	5.4	1.6	0.8	2.4	3.1
Switzerland	0.9	0.4	0.4	0.3	0.1
Turkey	2.9	1.6	2.2	0.4	A
United Kingdom	2.4	0.8	1.8	4.7	2.9
Other	3.8	3.5	3.3	2.8	1.5
NORTH AND CENTRAL AMERICA	17.6	14.8	17.3	22.8	19.6
Canada	5.6	3.9	5.1	5.6	6.5
Mexico	11.7	10.4	11.8	16.8	12.6
Other	0.3	0.5	0.4	0.4	0.5
SOUTH AMERICA	0.8	2.9	4.8	8.2	5.0
Brazil	0.2	0.8	0.9	0.8	1.5
Colombia	—	0.2	0.7	1.3	1.1
Venezuela	0.2	2.0	2.7	5.2	1.4
Other	0.4	0.1	0.5	0.9	1.0
ASIA	8.2	7.7	9.5	15.3	16.4
China	0.5	0.2	1.7	3.4	5.4
India	0.2	1.9	A	0.5	1.0
Japan	0.7	2.5	1.0	1.5	1.9
Korea, Rep. of	0.2	0.4	3.0	6.4	3.4
Singapore	1.3	1.4	1.9	0.9	1.6
Taiwan	1.1	0.6	0.5	0.4	0.8
Thailand	na	na	na	na	0.7
Other	4.2	0.7	1.4	2.2	1.6
OCEANIA	0.1	0.2	0.6	0.9	1.9
AFRICA	A	0.1	0.3	0.4	0.2

A — Less than $50,000

U.S. EXPORTS


Leading Destinations of 1989 U.S. Exports
Metal Cutting Machine Tools
Valued under $2,500

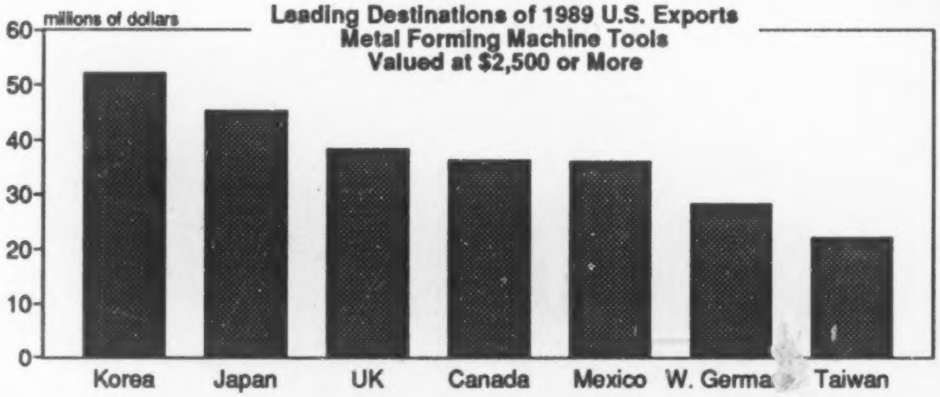
Metal Cutting Machine Tools Valued Under $2,500

(in millions of dollars)

Country of Destination	1985	1986	1987	1988	1989
TOTAL	$9.6	$13.0	$14.7	$16.4	$15.0
EUROPE	2.0	3.9	3.7	3.9	3.0
Belgium	0.4	0.6	0.5	0.2	A
France	A	0.3	0.1	0.2	0.2
Germany, Fed. Rep.	0.5	0.7	0.9	1.0	0.6
United Kingdom	0.6	1.1	1.2	1.4	1.3
Other	0.5	1.2	1.0	1.1	0.9
NORTH AND CENTRAL AMERICA	4.4	4.5	5.3	7.0	5.9
Canada	2.9	3.3	4.2	4.6	3.4
Mexico	1.3	1.0	0.9	2.1	2.3
Other	0.2	0.2	0.2	0.3	0.2
ASIA	1.9	2.7	3.8	2.8	5.3
Japan	0.7	1.2	1.1	0.9	1.5
Korea, Rep. of	0.1	0.2	0.4	0.4	0.6
Singapore	0.1	0.2	0.4	0.4	0.7
Other	1.0	1.1	1.9	1.2	2.5
AFRICA	0.3	0.2	0.4	0.6	A

A — Less than $50,000

U.S. EXPORTS


Leading Destinations of 1989 U.S. Exports
Metal Forming Machine Tools
Valued at $2,500 or More

New, Complete Metal Forming Machine Tools Valued at $2,500 or More

(in millions of dollars)

Country of Destination	1985	1986	1987	1988	1989
TOTAL	$154.4	$208.7	$243.5	$304.1	$392.4
EUROPE	36.6	60.0	56.2	83.0	121.1
Belgium	0.8	2.4	1.0	1.3	3.7
France	3.1	6.0	6.3	8.2	9.9
Germany, Fed. Rep.	10.3	15.8	11.9	21.6	28.3
Ireland	0.7	1.2	1.3	2.2	5.5
Italy	2.3	9.3	5.4	7.9	9.2
Netherlands	1.2	1.0	2.8	4.6	3.9
Spain	0.7	1.2	1.7	4.9	4.0
Sweden	0.4	2.9	3.3	1.2	5.6
Turkey	1.1	8.1	4.7	2.2	0.5
United Kingdom	11.2	7.3	9.6	24.1	38.2
Other	4.8	4.8	8.2	4.8	11.3
NORTH AND CENTRAL AMERICA	49.3	67.6	66.7	77.5	75.5
Canada	28.1	39.7	35.2	43.8	36.3
Mexico	20.3	27.4	30.2	31.7	36.1
Other	0.9	0.5	1.3	2.0	3.1
SOUTH AMERICA	6.8	7.1	15.2	24.9	18.1
Brazil	3.7	2.2	7.9	10.1	7.7
Venezuela	1.4	2.8	5.0	9.8	4.7
Other	1.7	2.1	2.3	5.0	5.7
ASIA	43.5	68.0	95.0	101.6	170.6
China	4.7	15.7	17.1	9.1	8.4
Hong Kong	1.3	0.2	1.7	4.3	5.7
Israel	1.9	2.6	0.4	2.4	4.0
Japan	15.9	15.8	25.9	33.9	45.3
Korea, Rep. of	5.0	12.1	36.2	23.5	52.2
Malaysia	na	na	na	na	1.4
Singapore	4.5	2.5	4.3	2.3	7.6
Taiwan	2.7	5.9	4.5	12.6	22.1
Thailand	na	na	na	na	2.4
Other	7.5	31.2	4.9	13.5	21.5
OCEANIA	10.3	4.3	5.8	12.4	6.2
Australia	10.1	3.9	5.1	10.6	5.9
Other	0.2	0.4	0.7	1.8	0.3
AFRICA	7.8	1.6	4.6	2.5	0.9

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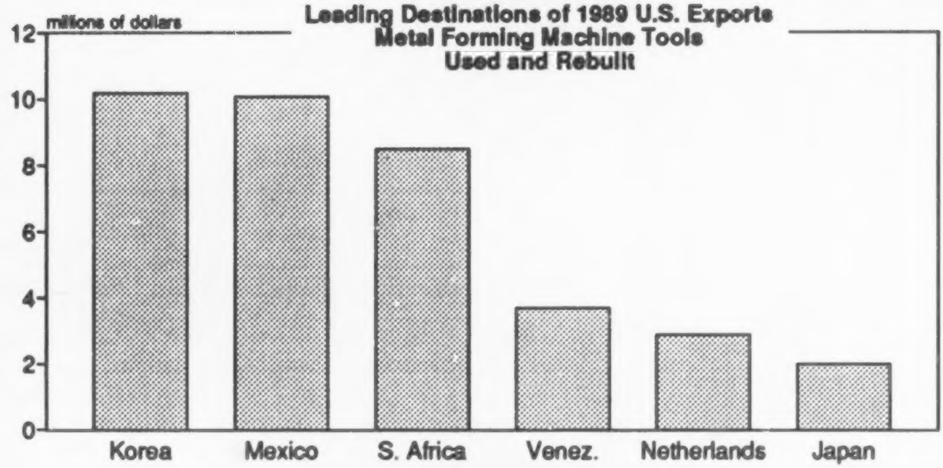
U.S. EXPORTS

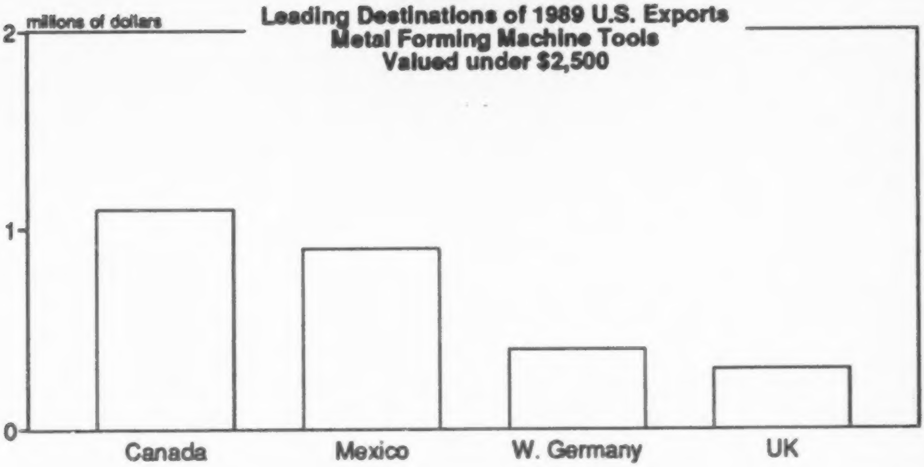

Leading Destinations of 1989 U.S. Exports
Metal Forming Machine Tools
Used and Rebuilt

Metal Forming Machine Tools
Used and Rebuilt

(in millions of dollars)

Country of Destination	1985	1986	1987	1988	1989
TOTAL	$8.5	$7.6	$19.1	$16.7	$63.7
EUROPE	0.8	1.6	0.9	4.0	9.0
Germany, Fed. Rep.	0.4	0.1	0.4	0.6	1.4
Italy	A	0.8	0.1	0.2	0.6
Netherlands	—	0.1	—	—	2.9
United Kingdom	A	0.1	0.3	1.1	1.2
Other	0.4	0.5	0.1	2.1	2.9
NORTH AND CENTRAL AMERICA	5.4	2.6	3.8	7.5	16.3
Canada	2.8	0.5	0.6	2.2	5.0
Mexico	2.4	2.0	3.1	5.2	10.1
Other	0.2	0.1	0.1	0.1	1.2
SOUTH AMERICA	0.1	0.2	4.4	1.7	8.6
Brazil	—	A	1.3	0.2	1.7
Colombia	A	0.1	0.1	0.5	0.9
Venezuela	0.1	A	2.9	0.1	3.7
Other	A	0.1	0.1	0.9	2.3
ASIA	1.7	3.0	9.7	3.3	20.0
China	0.2	A	3.3	1.2	3.3
Hong Kong	A	A	0.1	—	1.1
India	0.2	—	0.1	A	0.4
Japan	0.1	0.5	0.1	0.2	2.0
Korea, Rep. of	A	0.1	5.3	1.5	10.2
Singapore	0.4	0.5	0.4	0.1	0.6
Taiwan	A	1.7	—	—	0.4
Thailand	na	na	na	na	1.5
Other	0.8	0.2	0.4	0.3	0.5
OCEANIA	0.5	0.2	0.2	0.1	1.0
AFRICA	A	0.1	0.1	0.1	8.8

A — Less than $50,000.



Metal Forming Machine Tools
Valued Under $2,500

(in millions of dollars)

Country of Destination	1985	1986	1987	1988	1989
TOTAL	$3.5	$2.8	$4.2	$3.9	$4.8
EUROPE	0.5	0.3	0.6	0.9	1.3
Germany, Fed. Rep.	0.2	0.1	0.2	0.4	0.4
United Kingdom	A	A	0.1	0.1	0.3
Other	0.3	0.2	0.3	0.4	0.6
NORTH AND CENTRAL AMERICA	2.7	1.9	3.1	2.3	2.0
Canada	1.8	1.2	2.2	1.3	1.1
Mexico	0.9	0.7	0.8	0.9	0.9
Other	—	—	0.1	0.1	—
ASIA	0.2	0.2	0.3	0.3	0.8
OTHER	0.1	0.4	0.2	0.4	0.7

A — Less than $50,000.

U.S. IMPORTS BY MACHINE CLASSIFICATION, 1987 AND 1988

Metal Cutting Machine Tools and Parts

(values in thousands of dollars)

	1987		1988	
Machine Classification	Units	Value	Units	Value
GRAND TOTAL	1,124,000	$1,803,014.(a)	1,079,288	$1,865,240 E(a)
Complete New Machines	1,119,329	$1,416,080	1,077,326	$1,543,327
Gear Hobbers	89	14,510	78	10,773
Gear Shapers	50	6,481	15	3,744
Gear Cutting Machines N.E.C.	35	2,488	41	2,712
Vertical Mach. Ctrs. ATC, NC, Y–Axis Travel:				
26" or Less	1,529	127,129	1,788	140,591
Over 26"	191	17,493	99	11,004
Horizontal Machining Centers, ATC, NC	723	113,747	688	112,921
Machining Center, NC N.E.C.	471	55,058	344	61,760
Sing. Station and Multi–Station Transfer Mach.	102	22,279	184	67,537
Way Type Machines (Unit Heads)	3	0,179	0	0
Horiz. Boring–Drilling–Milling Machines:				
Table Type, NC	9	3,699	16	1,536
NC N.E.C.	61	17,479	48	8,880
Boring–Drilling–Milling Machines:				
Vertical , NC	163	13,591	135	13,062
Horizontal. non–NC	36	2,701	14	1,658
Vertical, non–NC	233	6,261	192	6,068
Drilling Machines:				
NC	159	7,621	273	11,604
Multi–Spindle, non–NC	71	2,220	98	1,238
Radial, non–NC	183	1,071	201	1,329
Upright, Single Spindle, non–NC	71	680	165	1,674
non–NC N.E.C.	727	17,549	586	17,666
Milling Machines:				
NC	643	41,285	468	32,059
Profiling, Dupl. & Die Sinking, non–NC	15	864	31	1,896
Knee Type, non–NC	2,753	16,625	3,127	18,442
Bed Type, non–NC	214	6,447	314	11,021
non–NC N.E.C.	1,141	22,141	2,277	39,657
Vertical Boring Machines, incl. VTLs :				
NC	27	5,654	10	2,543
non–NC	90	2,452	41	1,538
Boring Machines:				
NC N.E.C.	44	5,921	14	3,018
non–NC N.E.C.	357	24,218	368	10,729
Horizontal Lathes:				
Multi–Spindle, NC	116	12,875	170	20,144
Single Spindle, Less Than 25 HP, NC	3,006	172,050	3,459	216,263
Single Spindle, 25–50 HP, NC	417	44,610	522	64,495
Single Spindle, Over 50 HP, NC	157	12,767	57	3,974

Continued

(a) The data may not add to totals due to rounding.

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U.S. IMPORTS BY MACHINE CLASSIFICATION, 1987 AND 1988

Metal Cutting Machine Tools and Parts

(values in thousands of dollars)

	1987		19[illegible]	
Machine Classification	Units	Value	Units	Value
Continued				
Horiz. Engine & Toolroom Lathes, non–NC	3,039	$23,843	3,381	$30,427
Automatic Chucking Lathes:				
Single Spindle, non–NC	84	3,069	51	1,135
Multi–Spindle, non–NC	37	5,170	20	1,579
Automatic Bar Machines:				
Single Spindle, non–NC	52	2,472	119	3,394
Multi–Spindle, non–NC	46	2,229	45	2,237
Horizontal Lathes, non–NC N.E.C.	193	2,842	265	4,977
Vertical Lathes:				
Multi–Spindle, NC	103	7,557	67	9,412
NSPF, NC	219	21,702	174	16,470
excl. VTLs, non–NC	988	20,333	1,099	22,400
Gear Tooth Grinding & Finishing Machines	335	26,541	524	24,538
Tool & Cutter Grinding Machines:				
NC	48	2,392	106	7,240
non–NC	1,030	19,225	1,136	32,896
Honing & Lapping Machines	305	13,078	329	16,200
Grinding Machines Flat Surface:				
NC	45	4,280	62	8,236
Reciprocating Table, non–NC	312	4,881	732	11,511
non–NC N.E.C.	2,048	27,564	2,053	24,055
Grinding & Polishing Machines, NC N.E.C.	167	30,744	183	26,937
External Grinding Machines, non–NC	259	10,277	340	12,823
Internal Grinding Machines, non–NC	27	2,553	50	4,463
Grinding, Polishing & Buffing Machines, non–NC N.E.C.	107	8,201	165	6,227
Grinding Machines, non–NC N.E.C.	1,537	54,414	1,409	44,146
Traveling Wire Electrical Discharge Machines	626	42,539	860	65,295
All Other Electrical Discharge Machines	377	18,710	359	15,728
Spark Erosion, Ultrasonic & Electrolytic Machines:				
NC	114	16,233	110	14,267
non–NC	232	7,888	831	16,604
Metal Cutting Machine Tools, NC N.E.C.	122	70,810	283	18,286
Sawing & Cut–off Machines, non–NC	1,527	17,956	1,903	25,558
Broaching Machines, non–NC	88	4,504	119	3,024
Metal Cutting Machine Tools:				
non–NC N.E.C.	1,360	44,250	1,651	43,419
Less Than $2,500	1,090,016	99,106	1,041,115	107,246
Used or Rebuilt	4,671	19,813	1,962	20,963
Parts	—	367,121	—	300,900.E

(a) The data may not add to totals due to rounding.

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E – estimated by NMTBA, D – not disclosed, N.E.C – not elsewhere classified

U.S. IMPORTS BY MACHINE CLASSIFICATION, 1987 AND 1988

Metal Forming Machine Tools and Parts

(values in thousands of dollars)

	1987		1988	
Machine Classification	Units	Value	Units	Value
GRAND TOTAL	35,657	$609,301.(a)	39,460	\$575,582$_{\text{E}}$(a)
Complete New Machines	35,126	$552,775	38,912	$509,708
Die Casting Machines	448	19,686	514	43,665
Punching & Shearing Machines, Incl. Combination, NC	319	42,282	273	30,699
Shearing Machines, non–NC	725	15,464	662	11,575
Punching & Combination Punching & Shearing Machines, non–NC	572	9,384	570	11,374
Bending, Folding, Straightening & Flattening Machines, NC	224	16,905	276	20,204
Press Brakes, non–NC	654	17,206	570	18,004
Bending Rolls, Ram & Press Bending Machines, non–NC	125	1,691	92	1,596
Bending, Folding, Str. & Flattening Machines, non–NC $_{\text{N.E.C.}}$	1,124	25,518	1,125	35,677
Metal Forming Machine Tools, NC $_{\text{N.E.C.}}$	116	22,453	163	48,263
Mechanical Presses, non–NC	1,310	114,622	417	56,926
Hydraulic Presses, Vertical, Single Action, non–NC	202	43,084	78	36,697
Hydraulic & Pneumatic Presses, non–NC $_{\text{N.E.C.}}$	614	125,021	939	89,978
Headers & Upsetters, non–NC	130	8,214	98	10,021
Forging Machines, non–NC $_{\text{N.E.C.}}$	173	12,841	117	14,227
Metal Forming Machine Tools:				
non–NC $_{\text{N.E.C.}}$	1,824	68,693	2,597	69,489
Less Than $2,500	26,506	9,670	30,421	11,292
Used or Rebuilt	531	6,712	548	5,674
Parts	—	49,814	—	60,200$_{\text{E}}$

(a) The data may not add to totals due to rounding.

U.S. IMPORTS 1989

Metal Cutting Machine Tools

(values in thousands of dollars)

Machine Classification	1989	
	Units	Value
Traveling wire electro–discharge machines, NC	732	$60,803
Traveling wire electro–discharge machines, non–NC	257	16,700
Electro–discharge machines, NC N.E.C.	159	11,229
Electro–discharge machines, on–NC N.E.C.	377	15,358
Vert. mach. ctrs., ATC, Y–axis travel not over 660mm(26")	2,456	201,060
Vert. mach. ctrs., ATC, Y–axis travel over 660mm(26")	226	30,291
Horiz. mach. ctrs., ATC	832	136,510
Mach. ctrs N.E.C.	296	42,644
Unit construction mach. (single station transfer), NC	31	4,393
Unit construction mach. (single station transfer), non–NC	15	777
Multi–station transfer machines, NC	27	20,051
Multi–station transfer machines, non–NC	108	28,948
Horiz. lathes, multiple spindle, NC	365	51,824
Horiz. lathes, power rating under 18.65 kW (25 HP), NC	3,030	227,428
Horiz. lathes, power rating 18.65–37.3 kW (25–50 HP), NC	656	85,013
Horiz. lathes, power rating over 37.3 kW (50 HP), NC	88	13,648
Horiz. engine or toolroom lathes, non–NC	3,076	29,324
Automatic bar and/or chucking mach., single spindle, non–NC	509	12,768
Automatic bar and/or chucking mach., mult. spindle, non–NC	150	6,433
Horiz. lathes, non–NC	929	13,330
Vertical turret lathes, multiple spindle, NC	28	12,802
Vertical turret lathes, NC N.E.C.	47	7,499
Vertical lathes, excl. VTLs, mult. spindle, NC	4	1,164
Vertical lathes, excl. VTLs, NC N.E.C.	77	9,317
Vertical turret lathes, non–NC	65	4,818
Vertical lathes, excl. VTLs, non–NC N.E.C.	830	23,321
Way–type unit head machines	12	836
Other drilling machines, NC	522	38,961
Drilling machines, multiple spindle, non–NC	125	5,721
Drilling machines, radial, non–NC	463	2,890
Drilling, upright, ex. sensitive, turret & deep hole, non–NC	199	1,553
Drilling machines, non–NC N.E.C.	472	24,979
Boring–milling mach., horiz. spind., table, excl. planer, NC	16	3,932
Boring–milling mach., horiz. spindle, NC N.E.C.	216	15,980
Boring–milling mach., NC N.E.C.	58	5,706
Boring–milling mach., horiz. spindle, non–NC N.E.C.	42	1,612
Boring–milling mach., excl. horiz. spindle, non–NC N.E.C.	163	6,654
Boring machines, vertical, NC	17	6,395
Boring machines, vertical, non–NC	75	946
Boring machines, NC N.E.C.	12	2,790
Boring machines, non–NC N.E.C.	228	13,079

Continued

U.S. IMPORTS 1989

Metal Cutting Machine Tools

(values in thousands of dollars)

Machine Classification	1989 Units	1989 Value
Continued		
Milling machines, knee type, NC	1,090	$16,338
Milling machines, knee type, non–NC	3,737	31,813
Milling machines, excl. knee type, NC N.E.C.	504	43,058
Milling machines, profile, dup., or die sinking, non–NC	107	859
Milling machines, bed type, non–NC	96	2,889
Milling machines, non–NC N.E.C.	648	17,511
Threading or tapping machines, NC N.E.C.	296	15,073
Threading or tapping machines, non–NC N.E.C.	289	9,190
Flat surface grinding mach., NC	159	11,750
Flat surface grinding mach., recip.–table type, non–NC	1,123	12,369
Flat surface grinding mach., non–NC N.E.C.	1,813	19,639
Grinding mach., of an accuracy at least 0.01mm, NC N.E.C	547	91,743
Grinding mach., external cylindrical, (incl. univ.), non–NC	457	14,689
Grinding mach., internal cylindrical, non–NC	146	12,984
Grinding mach., of accuracy at least 0.01mm, non–NC N.E.C	1,178	45,541
Sharpening machines (tool & cutter grinding), NC	342	4,027
Sharpening machines (tool & cutter grinding), non–NC	729	9,890
Honing or lapping machines, NC	35	6,889
Honing or lapping machines, non–NC	195	6,760
Grinding, honing, polishing, & lapping mach., NC N.E.C.	52	4,498
Grinding, honing, polishing, & lapping mach, non–NC N.E.C.	1,329	32,821
Planing machines, NC	0	0
Planing machines, non–NC	6	109
Shaping or slotting machines, NC	36	5,571
Shaping or slotting machines, non–NC	55	3,450
Broaching machines, NC	13	6,366
Broaching machines, non–NC	44	4,344
Gear hobbers	103	15,952
Gear shapers	19	3,034
Gear cutting machines N.E.C.	443	1,546
Gear grinding or finishing machines	183	24,944
Sawing or cutting–off machines, NC	171	4,211
Sawing or cutting–off machines, non–NC	1,809	25,975
Metal cutting machine tools N.E.C.	706	17,415
Used or rebuilt machine tools	6,482	38,579
Machine tools valued under $2,500	715,675	97,494
Y–T–D Cutting Total	758,607	1,859,106
NC Y–T–D Cutting Total	13,189	1,203,314

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U.S. IMPORTS 1989

Metal Forming Machine Tools

(values in thousands of dollars)

Machine Classification	1989 Units	 Value
Die casting machines	4,105	$44,684
Headers and upsetters, including cold headers	138	11,618
Forging or die stamping machines, and hammers N.E.C.	1,416	81,502
Bending, folding, straight. or flat. mach., incl presses, NC	991	37,184
Press brakes, non–NC	374	9,764
Bending rolls, non–NC	77	2,022
Bending, folding, straight., or flat. non–NC N.E.C.	1,071	45,446
Shearing machines, NC	57	6,661
Shearing machines, non–NC	738	14,001
Punching or notching mach., incl. comb. punch & shear, NC	362	40,916
Punching or notching mach., incl. comb. punch & sh., non–NC	643	13,688
Hydraulic presses, NC	43	6,466
Hydraulic presses, non–NC	684	23,578
Presses, NC N.E.C.	93	6,498
Presses, mechanical, non–NC	66	23,337
Presses, non–NC N.E.C.	1,085	82,903
Draw benches for bars, tubes, profiles, wire or the like	39	5,009
Thread rolling machines	62	3,086
Machines for working wire	742	35,780
Metal forming machine tools N.E.C.	799	29,113
Used or rebuilt machine tools	3,037	17,486
Machine tools valued under $2,500	22,580	6,799
Y–T–D Forming Total	39,202	547,543
NC Y–T–D Forming Total	1,546	97,727
CUTTING AND FORMING TOTALS:		
Y–T–D Total	797,809	2,406,649
NC Y–T–D Total	.4,735	1,301,041

Other Manufacturing Technology

Machine Classification	1989 Units	 Value
Machine tool parts and accessories	–	$579,435
Quenching or cutting oils	–	79
Industrial robots for lifting, handling, loading or unload	1,981	43,625
Laser, light or photon beam for working metal, NC	121	18,124
Laser, light or photon beam for working metal, non–NC	48	4,954
Laser, light or photon beam for other materials	2,125	6,935
Ultrasonic processes for working metal, NC	6	952
Ultrasonic processes for working metal, non–NC	12	29
Ultrasonic processes for working other materials	148	1,163
Injection molding mach., for rubber or oth. thermosetting	1,029	90,553
Injection molding mach., for thermoplastics	2,685	268,022
Extruders for rubber or other thermosetting materials	216	24,197
Extruders for processing thermoplastics	731	43,996
Blow molding machines	302	43,082
Vacuum–molding and other thermoforming machines	315	15,800
Industrial robots N.E.C.	23,945	137,767
Industrial robot parts	–	47,214
Numerical controls for controlling machine tools	13,534	52,862
Machines and appliances for testing metals	–	14,217
Machines for balancing mechanical parts	–	10,405
Profile projectors	–	4,925
Industrial process control instr., hydraulic	211,812	2,846
Industrial process control instr., pneumatic	168,982	3,419

U.S. EXPORTS BY MACHINE CLASSIFICATION, 1987 AND 1988

Metal Cutting Machine Tools and Parts

(values in thousands of dollars)

Machine Classification	1987		1988	
	Units	Value	Units	Value
GRAND TOTAL	39,355	$585,842.(a)	43,684	$685,122
Complete New Machines	33,927	338,988	36,381	383,071
Gear Hobbers and Shapers	59	7,048	90	11,320
Gear Cutting Machines $_{\text{N.E.C.}}$	113	30,884	94	20,186
Vertical Mach. Ctrs. ATC, NC, Y–Axis Travel :				
26" or Less	29	1,734	103	8,252
Over 26"	5	739	11	2,923
Horizontal Machining Centers, ATC, NC	24	6,286	46	10,034
Machining Centers, NC $_{\text{N.E.C.}}$	144	11,815	123	9,598
Sing. Station and Multi–Station Transfer Mach.	23	14,550	23	12,564
Way Type Machines (Unit Heads)	13	2,245	11	1,031
Horiz. Boring–Drilling–Milling Machines:				
Table Type, NC	11	2,212	3	1,042
NC $_{\text{N.E.C.}}$	9	1,224	5	1,803
Boring–Drilling–Milling Machines:				
Vertical, NC	12	1,159	13	2,174
Horizontal, non–NC	15	1,508	8	1,074
Vertical, non–NC	73	2,228	39	2,198
Drilling Machines:				
NC	28	3,235	42	3,559
Multi–Spindle, non–NC	46	2,489	28	2,065
Radial, non–NC	41	433	21	680
Upright, Single Spindle, non–NC	14	246	12	393
non–NC $_{\text{N.E.C.}}$	195	4,096	198	4,540
Milling Machines:				
NC	82	19,073	21	7,747
Profiling, Dupl. & Die Sinking, non–NC	19	641	44	6,575
Knee Type, non–NC	3	92	3	139
Bed Type, non–NC	2	112	17	1,468
non–NC $_{\text{N.E.C.}}$	224	4,826	218	12,276
Vertical Boring Machines, incl. VTLs:				
NC	5	1,331	3	1,318
non–NC	140	9,794	135	5,554
Boring Machines:				
NC $_{\text{N.E.C.}}$	4	926	6	387
non–NC $_{\text{N.E.C.}}$	77	5,255	119	7,872
Horizontal Lathes:				
Multi–Spindle, NC	17	2,322	57	13,511
excl. Multi–Spindle, NC, Less Than 25 HP	103	8,383	139	10,930
excl. Multi–Spindle, NC, 25–50 HP	26	3,647	24	3,957
excl. Multi–Spindle, NC, Over 50 HP	15	2,947	10	2,756
Automatic Chucking Lathes:				
Single Spindle, non–NC	8	1,063	22	2,715
Multi–Spindle, non–NC	19	1,996	11	818
Automatic Bar Machines:				
Single Spindle, non–NC	44	1,439	32	753
Multi–Spindle, non–NC	49	1,922	44	1,908
Horizontal Lathes, non–NC $_{\text{N.E.C.}}$	508	14,973	408	10,340
Vertical Lathes:				
Multi–Spindle, excl. VTLs, NC	6	1,342	6	612
Multi–Spindle & VTLs, NC	14	1,401	14	781
excl. VTLs, non–NC	149	9,149	133	7,578
Horiz. Engine & Toolroom Lathes, non–NC	74	1,157	110	3,164
Grinding, Polishing, Honing & Lapping Machines, NC	188	31,060	276	38,567
Gear Tooth Grinding & Finishing Machines, non–NC	26	3,568	52	2,983
Tool & Cutter Grinding Machines, non–NC	238	7,976	432	7,711
Honing & Lapping Machines, non–NC	388	6,852	593	7,263

Continued

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U.S. EXPORTS BY MACHINE CLASSIFICATION, 1987 AND 1988

Metal Cutting Machine Tools and Parts

(values in thousands of dollars)

Machine Classification	1987 Units	1987 Value	1988 Units	1988 Value
Continued				
Grinding Machines, Flat Surface:				
Reciprocating Table, non–NC	117	$1,975	151	$2,586
non–NC, N.E.C.	368	23,366	394	35,136
External Grinding Machines, non–NC	41	4,043	23	3,927
Internal Grinding Machines, non–NC	34	6,310	45	6,576
Grinding, Polishing & Buffing Machines, non–NC N.E.C.	188	10,665	365	10,956
Grinding Machines, non–NC N.E.C.	339	11,480	327	13,089
Traveling Wire Electrical Discharge Machines	17	258	33	1,330
All Other Electrical Discharge Machines	139	3,247	246	3,994
Spark Erosion, Ultrasonic & Electrolytic Machines:				
NC	19	1,065	18	873
non–NC	52	1,845	108	4,046
Metal Cutting Machine Tools, NC N.E.C.	75	5,047	154	7,124
Sawing & Cut–off Machines, non–NC	467	6,961	679	12,093
Broaching Machines, non–NC	13	383	24	3,596
Metal Cutting Machine Tools:				
non–NC, N.E.C.	200	10,218	277	8,303
Less Than $2,500	28,578	14,664	29,740	16,400
Used or Rebuilt	5,628	44,557	7,303	60,586
Parts	—	202,297	—	241,485

Metal Forming Machine Tools

(values in thousands of dollars)

Machine Classification	1987 Units	1987 Value	1988 Units	1988 Value
GRAND TOTAL	11,924	$424,367.(a)	13,000	$534,682
Complete New Machines	11,210	$247,760	11,878	$307,954
Die Casting Machines & Parts	—	17,651	—	20,440
Metal Forming Mach. Tools, Less Than $2,500	7,114	4,217	6,051	3,855
Punching & Shearing Machines, incl. Combination, NC	71	8,543	105	16,969
Shearing Machines, non–NC	85	3,566	158	6,553
Punching & Combination Punching & Shearing Mach., non–NC	601	10,398	1,070	24,760
Bending, Folding, Straightening & Flattening Machines, NC	79	5,019	140	7,104
Press Brakes, non–NC	38	1,683	99	4,938
Bending Rolls, Ram & Press Bending Machines, non–NC	16	1,085	20	2,803
Bending, Folding, Str. & Flattening Machines, non–NC N.E.C.	728	25,552	988	34,291
Mechanical Presses, non–NC	255	22,889	304	28,378
Hydraulic Presses, Vertical, Single Action	56	6,733	121	7,794
Hydraulic & Pneumatic Presses	759	41,441	1,117	53,021
Headers & Upsetters, non–NC	90	15,865	94	22,793
Forging Machines, non–NC N.E.C.	190	8,038	171	4,265
Metal Forming Machine Tools, non–NC N.E.C.	1,130	75,039	1,440	69,966
Metal Forming Mach.Tools, Used or Rebuilt	714	19,121	1,122	16,671
Parts	—	157,496	—	210,067

(a) The data may not add to totals due to rounding.

U.S. EXPORTS 1989

Metal Cutting Machine Tools

(values in thousands of dollars)

Machine Classification	1989	
	Units	Value
Electro–discharge machines	344	$5,082
Vert. mach. ctrs., ATC, Y–axis travel not over 660mm(26")	31	4,918
Vert. mach. ctrs., ATC, Y–axis travel over 660mm(26")	9	1,343
Horiz. mach. ctrs., ATC	45	19,679
Mach. ctrs. N.E.C.	295	19,796
Unit construction mach. (single station transfer), NC	3	2,683
Unit construction mach. (single station transfer), non–NC	8	4,445
Multi–station transfer machines, NC	10	17,348
Multi–station transfer machines, non–NC	18	3,918
Horiz. lathes, multiple spindle, NC	4	634
Horiz. lathes, power rating under 18.65 kW (25 HP), NC	184	15,356
Horiz. lathes, power rating 18.65–37.3 kW (25–50 HP), NC	50	9,433
Horiz. lathes, power rating over 37.3 kW (50 HP), NC	8	1,767
Horiz. engine or toolroom lathes, non–NC	96	2,221
Automatic bar and/or chucking mach., single spindle, non–NC	20	109
Automatic bar and/or chucking mach., mult. spindle, non–NC	42	2,945
Horiz. lathes, non–NC N.E.C.	266	3,588
Vertical turret lathes, multiple spindle, NC	0	0
Vertical turret lathes, NC N.E.C.	5	863
Vertical lathes, excl. VTLs, mult. spindle, NC	2	539
Vertical lathes, excl. VTLs, NC N.E.C.	13	1,448
Vertical turret lathes, non–NC	23	698
Vertical lathes, excl. VTLs, non–NC N.E.C.	71	3,537
Way–type unit head machines	17	3,318
Other drilling machines, NC	107	7,765
Drilling machines, multiple spindle, non–NC	22	1,240
Drilling machines, radial, non–NC	25	963
Drilling, upright, ex. sensitive, turret & deep hole, non–NC	68	953
Drilling machines, non–NC	531	6,009
Boring–milling mach., horiz. spind., table, excl. planer, NC	7	2,588
Boring–milling mach., horiz. spindle, NC N.E.C.	4	738
Boring–milling mach., NC N.E.C.	33	2,492
Boring–milling mach., horiz. spindle, non–NC N.E.C.	3	247
Boring–milling mach., excl. horiz. spindle, non–NC N.E.C.	103	2,100
Boring machines, vertical, NC	4	1,294
Boring machines, vertical, non–NC	41	1,167
Boring machines, NC N.E.C.	1	1,350
Boring machines, non–NC N.E.C.	55	3,618

Continued

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U.S. EXPORTS 1989

Metal Cutting Machine Tools

(values in thousands of dollars)

Machine Classification	1989 Units	 Value
Continued		
Milling machines, knee type, NC	25	$1,699
Milling machines, knee type, non–NC	54	2,342
Milling machines, excl. knee type, NC N.E.C.	60	8,177
Milling machines, profile, dup., or die sinking, non–NC	24	1,290
Milling machines, bed type, non–NC	55	7,023
Milling machines, non–NC N.E.C.	303	6,716
Threading or tapping machines, NC N.E.C.	34	2,03[illegible]
Threading or tapping machines, non–NC N.E.C.	286	6,635
Flat surface grinding mach., NC	153	11,682
Flat surface grinding mach., recip.–table type, non–NC	137	1,823
Flat surface grinding mach., non–NC	98	8,715
Grinding mach., of an accuracy at least 0.01mm, NC N.E.C.	321	27,305
Grinding mach., external cylindrical, (incl. univ.), non–NC	45	5,835
Grinding mach., internal cylindrical, non–NC	59	5,919
Grinding mach., of accuracy at least 0.01mm, on–NC N.E.C.	474	21,481
Sharpening machines (tool & cutter grinding), NC	57	5,741
Sharpening machines (tool & cutter grinding), non–NC	1,204	11,593
Honing or lapping machines, NC	2	58
Honing or lapping machines, non–NC	741	9,784
Grinding, honing, polishing, & lapping mach., NC N.E.C.	35	3,653
Grinding, honing, polishing, & lapping mach.,non–NC N.E.C	630	14,786
Planing machines, NC	6	3,712
Planing machines, non–NC	176	6,065
Shaping or slotting machines, NC	0	0
Shaping or slotting machines, non–NC	56	1,356
Broaching machines, NC	4	369
Broaching machines, non–NC	53	2,364
Gear hobbers	78	6,909
Gear shapers	67	5,561
Gear cutting machines N.E.C.	87	32,273
Gear grinding or finishing machines	62	9,141
Sawing or cutting–off machines, NC	37	1,907
Sawing or cutting–off machines, non–NC	1,073	14,108
Metal cutting machine tools N.E.C.	371	13,697
Used or rebuilt machine tools	6,033	53,927
Machine tools valued under $2,500	40,171	14,963
Y–T–D Cutting Total	55,639	488,833
NC Y–T–D Cutting Total	1,633	184,588

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U.S. EXPORTS 1989

Metal Forming Machine Tools

(values in thousands of dollars)

	1989	
Machine Classification	Units	Value
Die casting machines	535	$8,753
Headers and upsetters, including cold headers	121	20,859
Forging or die stamping machines, and hammers N.E.C	681	20,262
Bending, folding, straight. or flat. mach., incl presses, NC	312	21,357
Press brakes, non–NC	33	1,308
Bending rolls, non–NC	56	1,686
Bending, folding, straight., or flat., non–NC N.E.C	618	22,357
Shearing machines, NC	59	4,249
Shearing machines, non–NC	274	5,471
Punching or notching mach., incl. comb. punch & shear, NC	162	23,923
Punching or notching mach., incl. comb. punch & sh., non–NC	772	23,777
Hydraulic presses, NC	87	6,697
Hydraulic presses, non–NC	595	25,652
Presses, NC N.E.C	64	7,435
Presses, mechanical, non–NC	223	13,211
Presses, non–NC N.E.C	675	39,407
Draw benches for bars, tubes, profiles, wire or the like	273	6,784
Thread rolling machines	42	2,873
Machines for working wire	929	31,943
Metal forming machine tools, N.E.C	2,035	104,370
Used or rebuilt machine tools	3,259	63,746
Machine tools valued under $2,500	6,403	4,837
Y–T–D Forming Total	18,208	460,956
NC Y–T–D Forming Total	684	63,660
CUTTING AND FORMING TOTALS:		
Y–T–D Total	73,847	949,789
NC Y–T–D Total	2,317	248,248

Other Manufacturing Technology

	1989	
Machine Classification	Units	Value
Machine tool parts and accessories	–	$714,343
Quenching or cutting oils	–	12,692
Industrial robots for lifting, handling, loading or unload	838	12,570
Laser, light or photon beam for working any material	2,303	43,081
Ultrasonic process for working any material	92	798
Injection molding mach., for rubber or oth. thermosetting	239	21,666
Injection molding mach., for thermoplastics	400	47,037
Extruders for rubber or other thermosetting materials	260	11,772
Extruders for processing thermoplastics	940	35,563
Blow molding machines	509	28,366
Vacuum–molding and other thermoforming machines	1,554	15,110
Industrial robots N.E.C	2,417	34,221
Industrial robot parts	–	15,601
Numerical controls for controlling machine tools	9,154	40,757
Machines and appliances for testing metals	–	74,219
Machines for balancing mechanical parts	–	21,293
Profile projectors	–	7,997
Industrial process control instr., hydraulic or pneumatic	778,332	46,924

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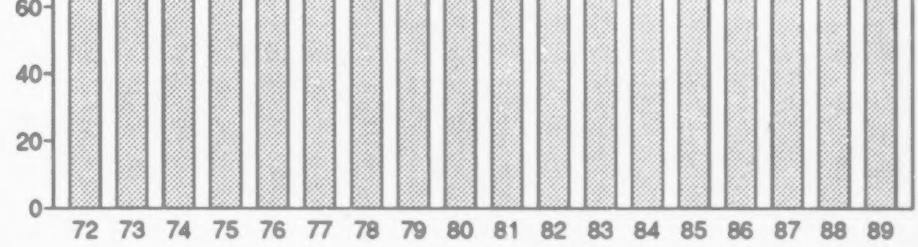
EMPLOYMENT IN THE U.S. MACHINE TOOL INDUSTRY

By Year 1970 to Date

(in thousands of people)

Year	Metal Cutting	Metal Forming	Total
1970	69.8	na	na
1971	56.6	na	na
1972	58.4	22.3	80.7
1973	66.6	25.5	92.1
1974	68.9	27.9	96.8
1975	63.7	24.3	88.0
1976	62.4	23.0	85.4
1977	65.2	23.3	88.5
1978	70.9	25.0	95.9
1979	77.4	26.9	104.3
1980	81.6	26.4	108.0
1981	80.0	24.4	104.4
1982	64.9	21.0	85.9
1983	52.0	17.1	69.1
1984	55.3	18.6	73.9
1985	53.8	19.2	73.0
1986	49.8	18.8	68.6
1987	46.2	17.2	63.4
1988(r)	49.3	18.4	67.7
1989(p)	53.5	19.5	73.0

Source: Bureau of Labor Statistics



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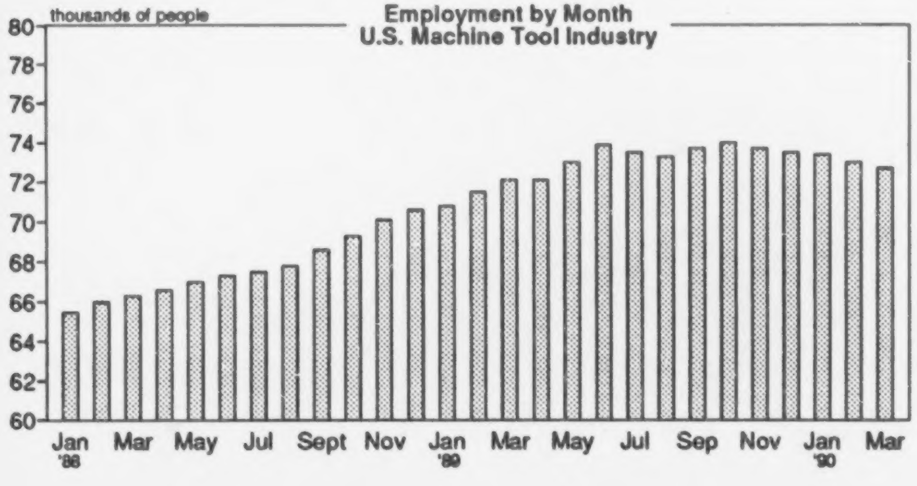
EMPLOYMENT IN THE U.S. MACHINE TOOL INDUSTRY

By Month 1988 to Date

(in thousands of people)

Month	Metal Cutting	Metal Forming	Total
1988			
January	47.7	17.8	65.5
February	48.1	17.9	66.0
March	48.3	18.0	66.3
April	48.5	18.1	66.6
May	48.8	18.2	67.0
June	48.8	18.5	67.3
July	49.0	18.5	67.5
August	49.3	18.5	67.8
September	49.9	18.7	68.6
October	50.5	18.8	69.3
November	51.1	19.0	70.1
December	51.5	19.1	70.6
1989			
January	51.7	19.1	70.8
February	52.2	19.3	71.5
March	52.7	19.4	72.1
April	52.7	19.4	72.1
May	53.6	19.4	73.0
June	54.3	19.6	73.9
July	53.9	19.6	73.5
August	53.8	19.5	73.3
September	54.1	19.6	73.7
October	54.2	19.8	74.0
November	53.9	19.8	73.7
December	53.7	19.8	73.5
1990			
January	53.5	19.9	73.4
February	53.1	19.9	73.0
March	52.9	19.8	72.7

Source: Bureau of Labor Statistics


Employment by Month
U.S. Machine Tool Industry

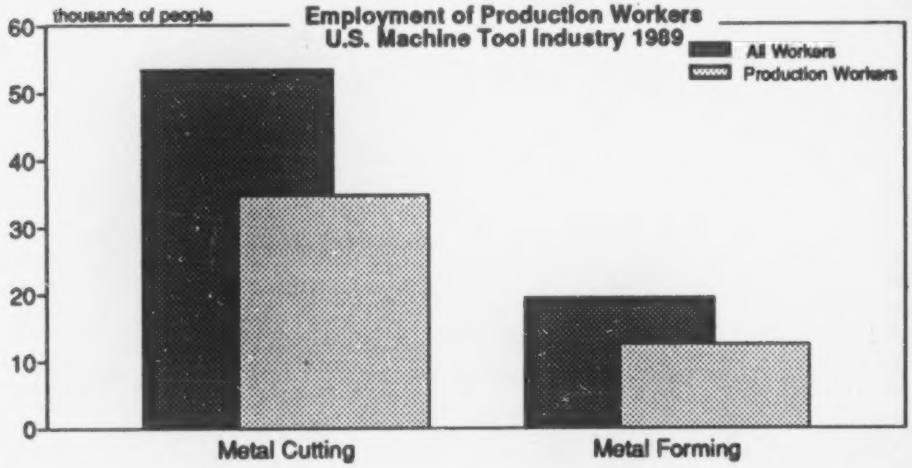
EMPLOYMENT IN THE U.S. MACHINE TOOL INDUSTRY

Employment of Production Workers 1970 to Date

(in thousands of people)

Year	Metal Cutting	Metal Forming	Total
1970	41.5	na	na
1971	39.4	na	na
1972	36.6	14.8	51.4
1973	43.4	17.5	60.9
1974	45.8	19.1	64.9
1975	41.7	15.7	57.4
1976	39.9	15.0	54.9
1977	41.9	15.4	57.3
1978	45.9	16.5	62.4
1979	51.2	17.7	68.9
1980	54.7	17.0	71.7
1981	52.0	15.3	68.1
1982	39.3	12.6	51.9
1983	29.9	9.9	39.8
1984	33.7	11.4	45.1
1985	33.9	11.8	45.7
1986	31.3	11.4	42.7
1987	29.1	10.8	39.9
1988	31.3	11.9	43.2
1989	34.8	12.6	47.4

Source: Bureau of Labor Statistics



AVERAGE WEEKLY EARNINGS FOR PRODUCTION WORKERS

U.S. Metal Cutting Machine Tool Industry

1970 to date

Year	Weekly Hours	Hourly Earnings	Weekly Earnings
1970	41.5	$4.00	$166.00
1971	39.4	4.20	165.48
1972	42.8	4.62	197.74
1973	45.1	4.90	220.99
1974	46.4	5.12	237.57
1975	42.7	5.54	236.56
1976	41.8	6.03	252.05
1977	43.9	6.61	290.18
1978	44.8	7.20	322.56
1979	44.3	7.71	344.21
1980	43.7	8.38	366.21
1981	42.1	9.12	383.95
1982	38.9	9.78	380.44
1983	39.0	9.91	386.49
1984	42.4	10.20	432.48
1985	42.6	10.58	450.71
1986	42.4	10.96	464.70
1987	42.0	11.08	465.36
1988	43.0	11.32	486.76
1989	43.9	11.67	512.31

U.S. Metal Forming Machine Tool Industry

1970 to date

Year	Weekly Hours	Hourly Earnings	Weekly Earnings
1970	na	na	na
1971	na	na	na
1972	42.4	$4.55	$192.92
1973	44.5	4.93	219.39
1974	43.3	5.28	228.62
1975	41.8	5.51	230.32
1976	42.1	6.04	254.28
1977	42.1	6.56	276.18
1978	43.0	7.34	315.62
1979	42.3	7.82	330.79
1980	41.2	8.48	349.38
1981	39.3	9.27	364.31
1982	38.0	9.97	378.86
1983	38.6	10.45	403.37
1984	42.4	10.61	449.86
1985	41.9	10.93	457.97
1986	42.0	11.49	482.58
1987	42.5	11.52	489.60
1988	44.8	11.86	531.33
1989	44.2	12.15	537.03

Source: Bureau of Labor Statistics

GENERAL STATISTICS, 1970 TO DATE

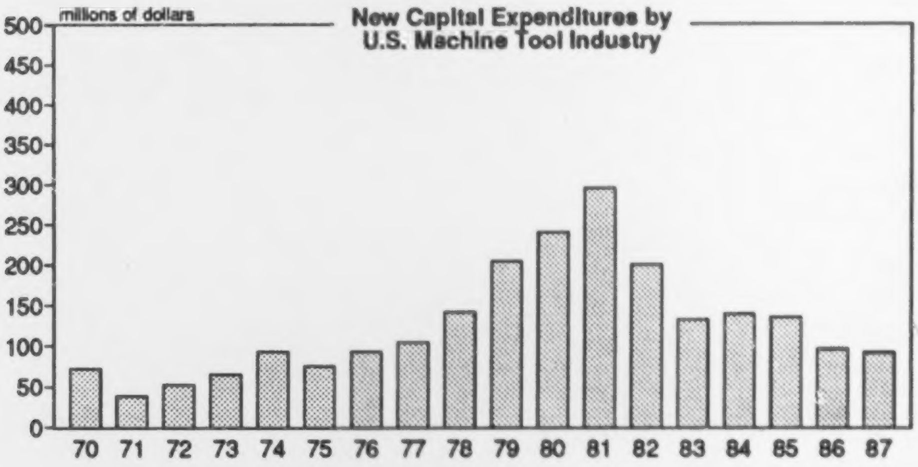
U.S. Machine Tool Industry

(millions of dollars)

Year	Establishments Total	Establishments With 20 or More Employees	Value Added Manufacture	Cost of Materials	Value of Shipments	New Capital Expenditures	End of Year Inventories
1970	na	na	$1,581.7	$ 992.6	$2,597.8	$ 72.7	$ 820.5
1971	na	na	1,183.7	751.2	2,018.8	39.1	726.0
1972	1,277	437	1,319.4	821.6	2,114.4	52.7	724.9
1973	na	na	1,760.6	1,134.9	2,777.3	65.9	885.7
1974	na	na	2,250.7	1,523.3	3,579.8	93.3	1,150.0
1975	na	na	2,258.6	1,533.5	3,834.4	76.1	1,100.4
1976	na	na	2,265.2	1,286.2	3,566.9	93.5	1,048.3
1977	1,343	469	2,588.0	1,491.7	3,943.3	105.1	1,237.5
1978	na	na	3,108.3	1,994.1	4,977.8	142.4	1,434.0
1979	na	na	3,837.8	2,423.9	6,052.5	205.7	1,689.2
1980	na	na	4,391.3	2,744.6	6,980.7	241.0	1,874.6
1981	na	na	4,716.4	2,850.0	7,481.0	296.2	1,965.2
1982	1,394	455	3,294.0	2,172.9	5,840.2	201.1	1,947.0
1983	na	na	2,242.3	1,554.9	4,023.2	132.9	1,713.2
1984	na	na	2,595.9	1,904.9	4,520.3	139.8	1,620.5
1985	na	na	2,933.2	2,070.3	4,789.8	135.3	1,919.0
1986	na	na	2,589.5	2,251.2	4,984.0	96.6	1,739.8
1987	624	352	2,403.0	2,037.3	4,585.8	92.3	1,586.1

Sources: U.S. Bureau of the Census, "Census of Manufactures, 1972, 1977, 1982, 1987 Metalworking Machinery and Equipment" and "Annual Survey of Manufactures."

The machine tool industry (Standard Industrial Classification SIC 3541 and 3542) produces primarily metal cutting and metal forming machine tools. It also produces other (secondary) products, such as small cutting tools, attachments and accessories and others. These secondary products as well as machine tool parts and some other items are included in this table. It therefore differs from other Census and NMTBA data on shipments of machine tools.



GENERAL STATISTICS, 1970 TO DATE

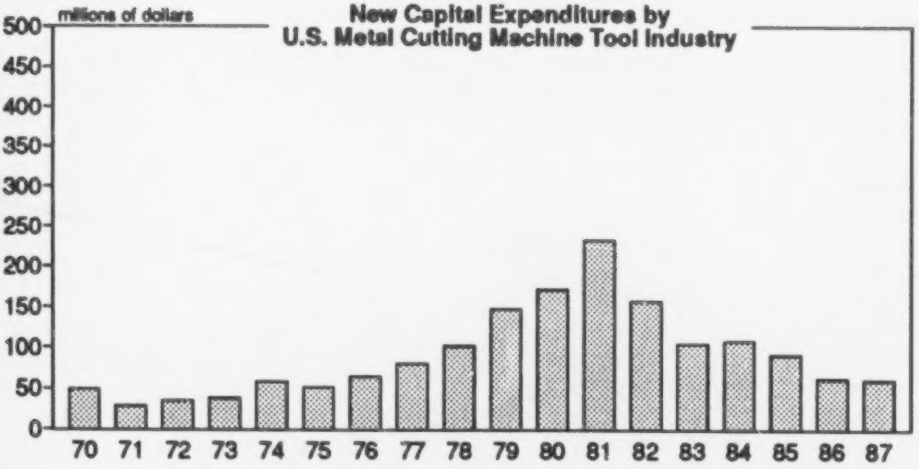
U.S. Metal Cutting Machine Tool Industry

(millions of dollars)

Year	Establishments Total	Establishments With 20 or More Employees	Value Added Manufacture	Cost of Materials	Value of Shipments	New Capital Expenditures	End of Year Inventories
1970	na	na	$1,112.1	$ 664.0	$1,821.7	$ 49.3	$ 562.9
1971	na	na	819.8	473.2	1,351.1	28.7	492.8
1972	894	275	901.7	536.3	1,418.1	35.2	482.2
1973	na	na	1,214.1	764.1	1,891.1	38.4	591.9
1974	na	na	1,617.0	1,017.9	2,480.5	58.9	786.2
1975	na	na	1,640.3	1,050.3	2,727.8	52.2	737.9
1976	na	na	1,664.1	852.3	2,496.2	65.2	735.4
1977	917	306	1,866.1	1,047.7	2,812.7	80.4	877.9
1978	na	na	2,267.0	1,417.7	3,611.8	102.0	1,012.3
1979	na	na	2,833.8	1,736.9	4,389.0	147.6	1,242.2
1980	na	na	3,349.2	2,026.1	5,227.6	171.6	1,419.4
1981	na	na	3,739.9	2,187.3	5,865.3	233.2	1,485.5
1982	942	293	2,516.2	1,598.3	4,411.5	157.7	1,435.5
1983	na	na	1,612.7	1100.0	2,880.9	104.8	1,281.8
1984	na	na	1,820.0	1,369.5	3,211.6	108.8	1,196.5
1985	na	na	2,000.0	1,471.8	3,377.0	91.6	1,349.7
1986	na	na	1,823.8	1,538.0	3,456.1	62.7	1,215.6
1987(p)	417	232	1,668.7	1,399.5	3,189.5	61.1	1,056.8

Sources: U.S. Bureau of the Census, "Census of Manufactures, 1972, 1977, 1982, 1987 Metalworking Machinery and Equipment" and "Annual Survey of Manufactures."

The metal cutting machine tool industry (Standard Industrial Classification SIC 3541) produces primarily metal cutting machine tools. It also produces other (secondary) products, such as plastics machinery, small cutting tools, attachments and accessories and others. These secondary products as well as machine tool parts and some other items are included in this table. It therefore differs from other Census and NMTBA data on shipments of machine tools.



©NMTBA p - preliminary, r - revised, na - not available, E - estimated by NMTBA, D - not disclosed

GENERAL STATISTICS, 1970 TO DATE

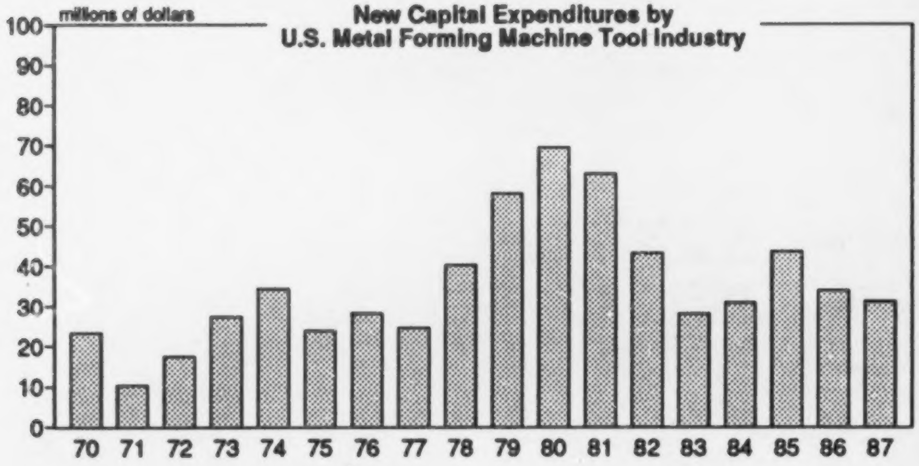
U.S. Metal Forming Machine Tool Industry

(millions of dollars)

Year	Establishments Total	Establishments With 20 or More Employees	Value Added Manufacture	Cost of Materials	Value of Shipments	New Capital Expenditures	End of Year Inventories
1970	na	na	$ 469.6	$328.6	$ 776.1	$23.4	$257.6
1971	na	na	363.9	278.0	667.7	10.4	233.2
1972	383	162	417.7	285.3	696.3	17.5	242.7
1973	na	na	546.5	370.8	886.2	27.5	293.8
1974	na	na	633.7	505.4	1,099.3	34.4	363.8
1975	na	na	618.3	483.2	1,106.6	23.9	362.5
1976	na	na	621.1	433.9	1,070.7	28.3	312.9
1977	426	163	721.9	444.0	1,130.6	24.7	359.6
1978	na	na	841.3	576.4	1,366.0	40.4	421.7
1979	na	na	1,004.0	687.0	1,663.5	58.1	447.0
1980	na	na	1,042.1	718.5	1,753.1	69.4	455.2
1981	na	na	976.5	662.7	1,615.7	63.0	479.7
1982	452	162	777.8	574.6	1,426.7	43.4	511.5
1983	na	na	629.6	454.9	1,142.3	28.1	431.6
1984	na	na	775.9	535.4	1,308.7	31.0	242.0
1985	na	na	933.2	598.7	1,412.8	43.7	569.3
1986	na	na	765.7	713.2	1,507.9	33.9	524.2
1987	207	120	734.3	637.8	1,396.3	31.2	529.3

Sources: U.S. Bureau of the Census, "Census of Manufactures, 1972, 1977, 1982, 1987 Metalworking Machinery and Equipment" and "Annual Survey of Manufactures."

The metal forming machine tool industry (Standard Industrial Classification SIC 3542) produces primarily metal forming machine tools. It also produces other (secondary) products, such as small cutting tools, attachments and accessories and others. These secondary products as well as machine tool parts and some other items are included in this table. It therefore differs from other Census and NMTBA data on shipments of machine tools.



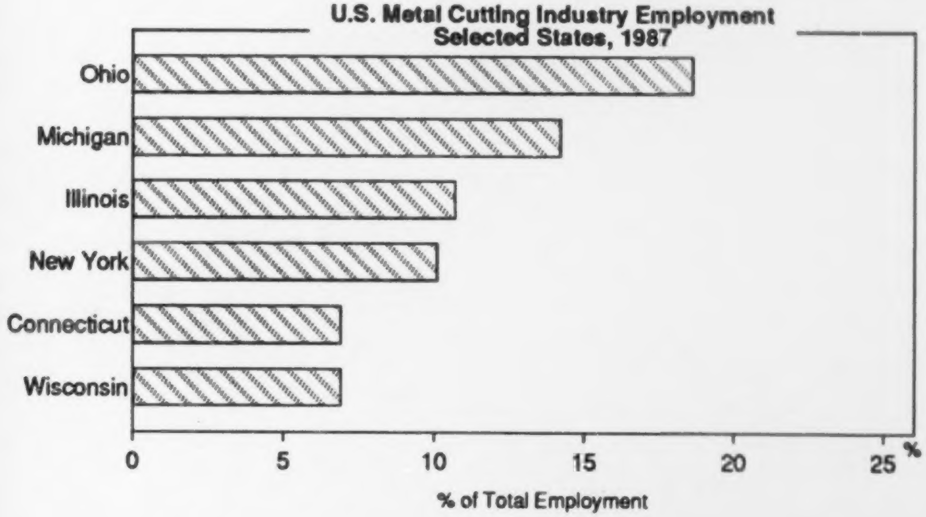
New Capital Expenditures by U.S. Metal Forming Machine Tool Industry

INDUSTRY STATISTICS FOR SELECTED STATES

U.S. Metal Cutting Machine Tool Industry

State	Establishments		% of
	Total	With 20 or More Employees	Total U.S. Employment
United States	417	232	100.0%
California	33	8	2.2
Connecticut	24	12	6.9
Florida	5	2	0.6
Illinois	41	22	10.7
Indiana	10	7	2.2
Iowa	1	1	na
Kansas	3	3	na
Kentucky	2	2	na
Massachusetts	17	8	3.8
Michigan	104	56	14.2
Minnesota	13	8	2.8
New Hampshire	2	2	na
New Jersey	12	6	1.3
New York	16	12	10.1
North Carolina	4	3	na
Ohio	43	25	18.6
Oregon	5	3	0.6
Pennsylvania	17	13	3.5
Rhode Island	6	4	na
South Carolina	4	3	na
Vermont	3	3	2.8
Virginia	3	3	na
Wisconsin	21	13	6.9

Source: 1987 Census of Manufactures

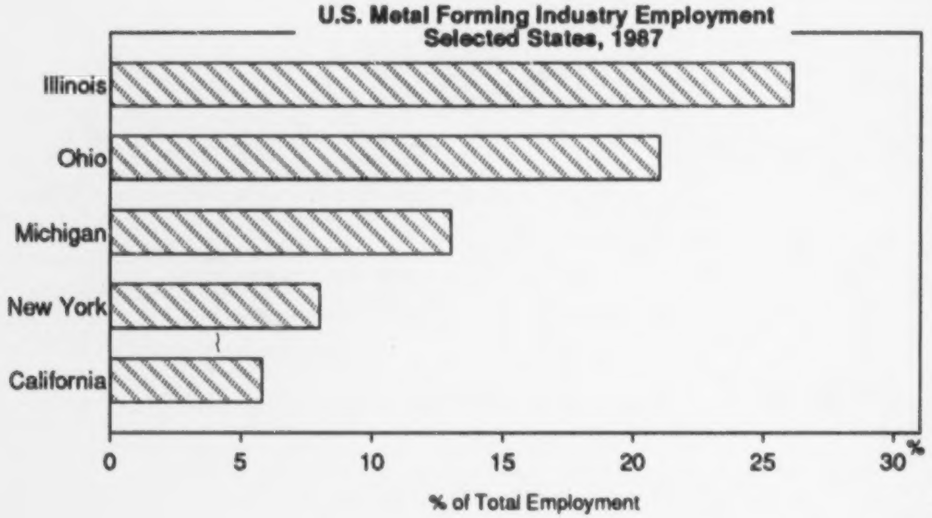

**U.S. Metal Cutting Industry Employment
Selected States, 1987**

INDUSTRY STATISTICS FOR SELECTED STATES

Metal Forming Machine Tool Industry

State	Establishments Total	 With 20 or More Employees	% of Total U.S. Employment
United States	207	120	100.0%
California	19	9	5.8
Colorado	2	2	na
Connecticut	9	3	2.2
Illinois	27	20	26.1
Indiana	9	6	2.2
Kansas	4	3	na
Massachusetts	3	3	na
Michigan	37	19	13.0
Missouri	5	3	1.4
New Jersey	9	4	2.2
New York	8	5	8.0
North Carolina	4	2	na
Ohio	27	16	21.0
Pennsylvania	7	6	3.6
Virginia	3	3	na

Source: 1987 Census of Manufactures



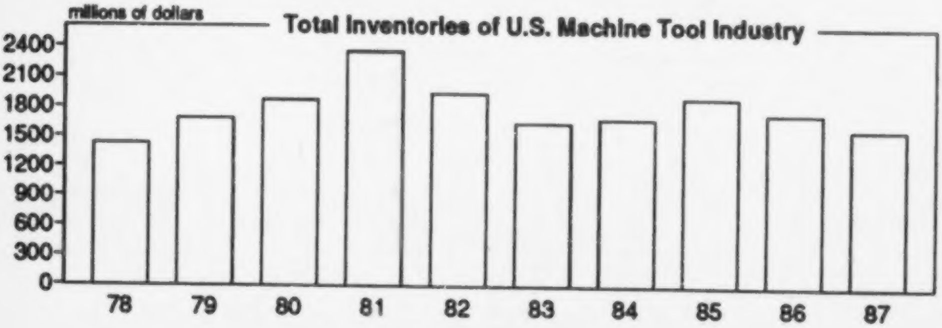
SUMMARY STATISTICS

U.S. Machine Tool Industry, 1987

Item	Metal Cutting	Metal Forming
Companies	381	196
All Establishments	417	207
With 1–19 employees	185	87
With 20–99 employees	169	87
With 100 employees or more	63	33
Compensation Total	100.0 %	100.0%
Annual Payroll	80.7	80.6
Social Security and other legally required payments	7.8	7.5
Fringe Benefits	11.5	11.9
(in millions of dollars)		
Cost of Materials	$1,399.5	$637.8
Materials, parts, containers, etc.	1,151.4	542.9
Resales	150.0	52.5
Fuels	9.6	4.3
Purchased electricity	34.5	12.4
Contract work	54.1	25.7
Total Value of Shipments	$3,189.5	$1,396.3
Primary Products	2,394.1	1,186.1
Secondary Products	484.8	116.7
Miscellaneous Receipts, total	310.6	93.5
Value of resales	206.7	70.3
Contract receipts	37.2	8.4
Sales of scrap or refuse	.2	.4
Receipts for R&D work	4.0	D
Receipts for repair work	40.9	3.8
Other	21.6	10.6
Inventories by stage of fabrication:		
Beginning of 1987	$1,180.0	564.1
Finished Goods	268.5	130.5
Work in process	681.6	343.1
Materials and supplies	229.9	90.5
End of 1987	1,056.8	529.3
Finished Goods	235.5	128.6
Work in process	593.3	320.8
Materials and supplies	229.9	90.5
Primary product specialization ratio [1]	83 %	91%
Coverage Ratio[2]	93	87
(mil kWh)		
Quantity of electric energy used for heat and power	565.2	234.5

[1] *Ratio of primary products to total product shipments for establishments classified in the industry.*

[2] *Ratio of primary products shipped by establishments classified in this industry to total shipments of such products by all manufacturing establishments, wherever classified. Source: 1987 Census of Manufactures*



INVENTORIES OF THE U.S. MACHINE TOOL INDUSTRY

End of Year, 1978 – 1987

(millions of dollars)

Year	Total Machine Tool	Metal Cutting SIC 3541	Metal Forming SIC 3542
		Total Inventories	
1978	$1,434.0	$1,012.3	$421.7
1979	1,689.2	1,242.2	447.0
1980	1,874.6	1,419.4	455.2
1981	2,359.1	1,764.9	594.2
1982	1,943.1	1,431.6	511.5
1983	1,642.9	1,219.4	423.5
1984	1,690.6	1,237.4	453.2
1985	1,899.1	1,343.7	555.4
1986	1,744.1	1,180.0	564.1
1987	1,586.1	1,056.8	529.3
		Finished Products	
1978	$282.4	$199.7	$ 82.7
1979	312.1	222.3	89.8
1980	354.1	253.5	100.6
1981	507.1	343.6	163.5
1982	501.0	355.6	145.4
1983	441.5	310.2	131.3
1984	404.0	282.2	121.8
1985	457.8	307.9	149.9
1986	399.0	268.5	130.5
1987	364.1	235.5	128.6
		Work in Process	
1978	$ 868.5	$ 642.3	$226.2
1979	1,042.8	812.5	230.3
1980	1,220.3	989.4	230.9
1981	1,413.2	1,117.4	295.8
1982	1,047.1	809.5	237.6
1983	863.8	669.7	194.1
1984	928.1	705.5	222.6
1985	1,092.8	784.0	308.8
1986	1,024.7	681.6	343.1
1987	914.1	593.3	320.8
		Materials, Supplies, Fuel, etc.	
1978	$283.1	$170.3	$112.8
1979	334.3	207.4	126.9
1980	300.0	176.4	123.6
1981	438.7	303.8	134.9
1982	395.0	266.5	128.5
1983	337.3	239.5	97.8
1984	358.5	249.7	108.8
1985	348.5	251.8	96.7
1986	320.0	229.9	90.5
1987	307.9	227.9	80.0

Sources: U.S. Bureau of the Census, "Census of Manufactures, 1987 Industry Series: Metalworking Machinery and Equipment, MC82(1)–35C" and earlier issues; U.S. Bureau of the Census, "Annual Survey of Manufactures."

Note: Beginning in 1983, a uniform reporting method was introduced based on cost or market valuations of inventories. This change replaces the numerous accounting methodologies accepted in the past.

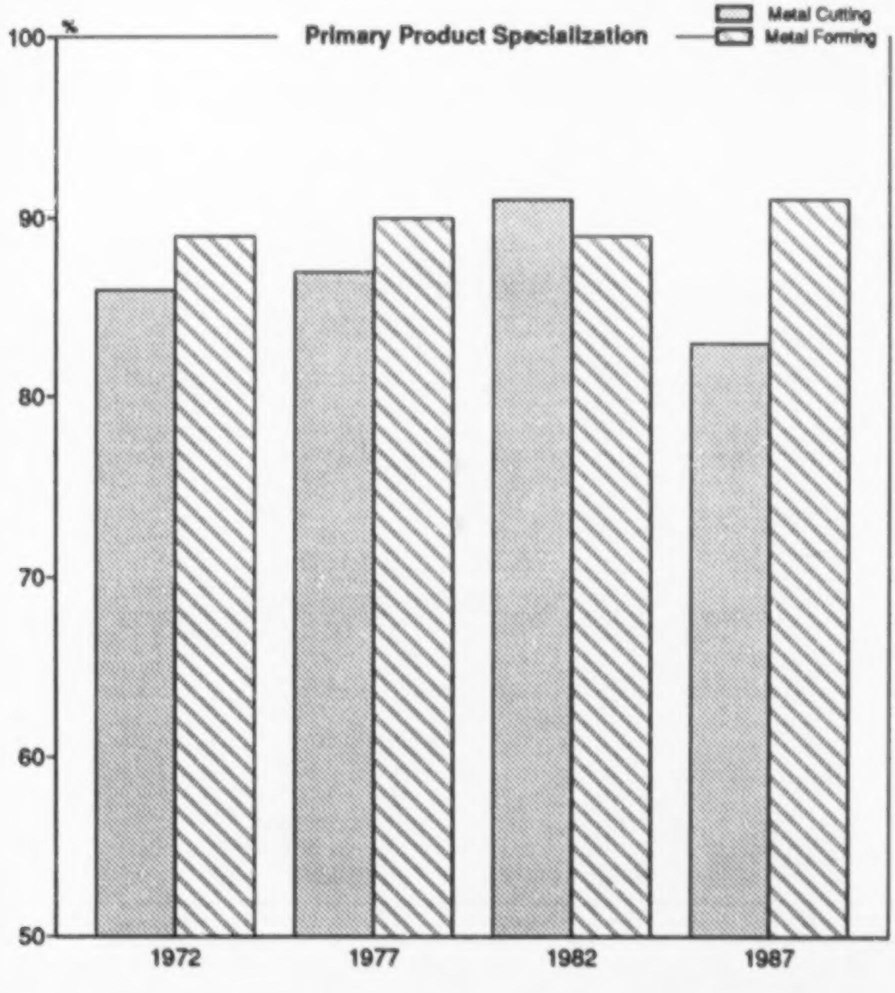
PRIMARY PRODUCT SPECIALIZATION

Selected Years, 1972 to 1987

	Metal Cutting Machine Tools	Metal Forming Machine Tools
1972	86%	89%
1977	87	90
1982	91	89
1987	83	91

Source: U.S. Bureau of the Census, "Census of Manufactures, 1987; Industry Series: Metalworking Machinery and Equipment MC82-1-35C" and earlier issues.

Note: "Primary Product Specialization" is arrived at by dividing "Primary Products" by "Primary Products plus Secondary Products." This shows the percentage of production devoted to actual machine tools rather than parts, accessories, and other items.



GROSS BOOK VALUE OF DEPRECIABLE ASSETS:

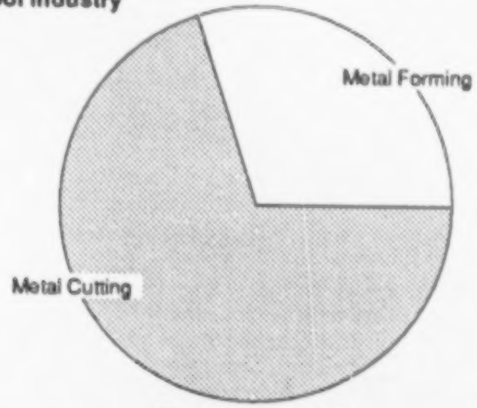
Capital Expenditures, Retirements, Depreciation, and Rental Payments: 1987

(in millions of dollars)

	Total Machine Tool	Metal Cutting SIC 3541	Metal Forming SIC 3542
Gross book value of depreciable assets:			
Total:			
Beginning of year:	$1,995.6	$1,419.3	$576.3
New Capital Expenditures	92.3	61.1	31.2
Used Captial Expenditures	8.9	5.6	3.3
Retirements	–95.5	–79.1	–16.4
End of year	2,001.6	$1,407.1	$594.5
Buildings and Other Structures:			
Beginning of Year	$542.3	$389.4	$152.9
New Capital Expenditures	14.6	12.2	2.4
Used Capital Expenditures	2.9	1.7	1.2
Retirements	–4.8	–4.1	–0.7
End of year	$555.1	$399.3	$155.8
Machinery and Equipment:			
Beginning of Year	$1,453.4	$1,030.0	$423.4
New Capital Expenditures	77.8	49.0	28.8
Used Capital Expenditures	6.1	3.9	2.2
Retirements	–90.7	–75.0	–15.7
End of year	$1,446.5	$1,007.8	$438.7
Depreciation charges during 1987:			
Total	$120.3	$85.7	$34.6
Buildings and other structures	19.9	14.7	5.2
Machinery and equipment	100.3	70.9	29.4
Rental Payments:			
Total	$35.4	$25.2	$10.2
Buildings	12.6	8.0	4.6
Machinery and Equipment	22.8	17.2	5.6

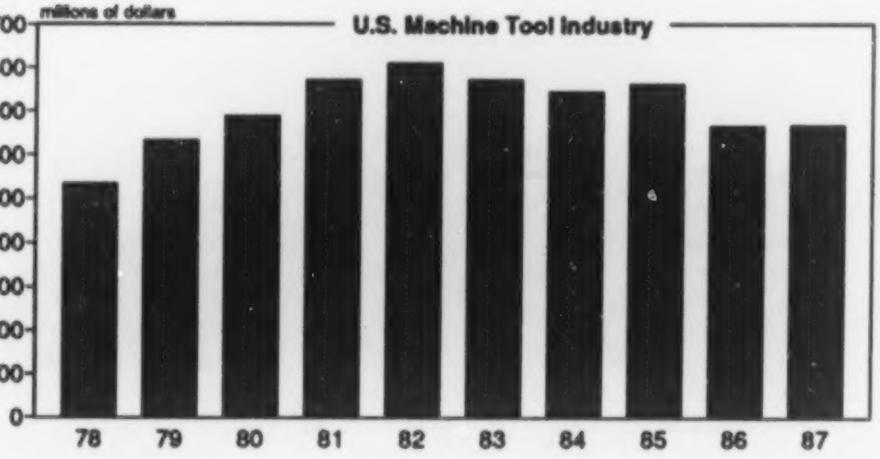
Source: 1987 Census of Manufactures

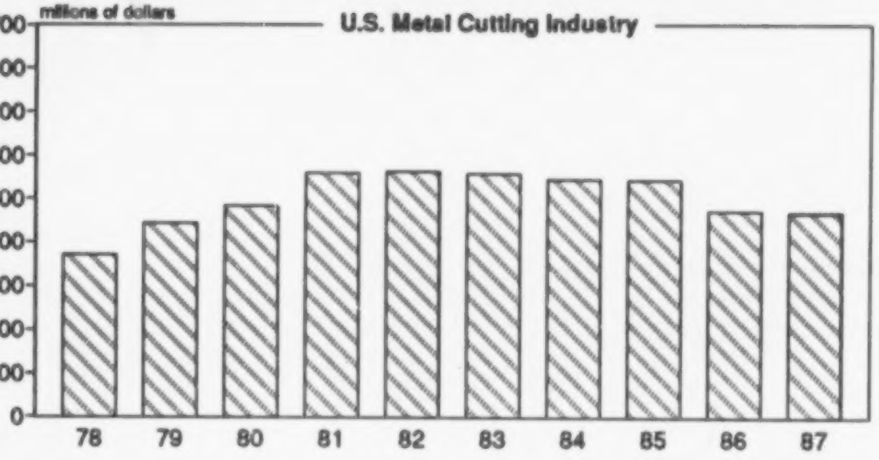
Gross Book Value of Depreciable Assets
U.S. Machine Tool Industry

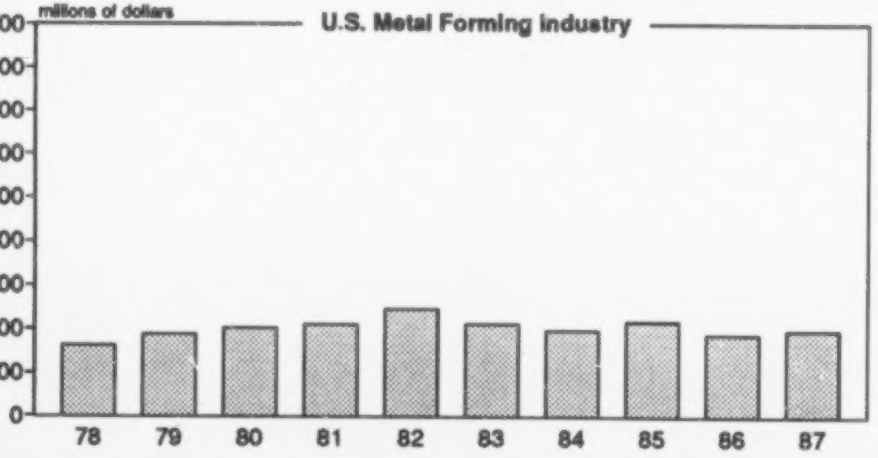


End of Year, 1987

GROSS BOOK VALUE OF DEPRECIABLE ASSETS







GROSS BOOK VALUE OF DEPRECIABLE ASSETS

Total U.S. Machine Tool Industry

(in millions of dollars)

Year	Gross Book Value	Building and Other Structures	Machinery and Equipment
1978	$1,602.7	$487.5	$1,135.3
1979	1,899.3	532.0	1,367.3
1980	2,065.1	584.8	1,480.3
1981	2,318.0	652.7	1,665.4
1982	2,433.6	676.7	1,756.9
1983	2,316.3	647.9	1,668.4
1984	2,233.1	631.5	1,601.2
1985	2,288.7	641.6	1,647.1
1986	1,995.6	542.3	1,453.4
1987	2,001.6	555.1	1,446.5

U.S. Metal Cutting Machine Tool Industry

(in millions of dollars)

Year	Gross Book Value	Building and Other Structures	Machinery and Equipment
1978	$1,115.1	$330.1	$785.1
1979	1,333.1	372.2	960.9
1980	1,453.0	416.6	1,036.4
1981	1,682.0	473.1	1,209.0
1982	1,692.0	474.7	1,217.4
1983	1,677.2	472.3	1,204.9
1984	1,637.9	467.0	1,170.9
1985	1,632.2	460.6	1,171.6
1986	1,419.3	389.4	1,030.0
1987	1,407.1	399.3	1,007.8

U.S. Metal Forming Machine Tool Industry

(in millions of dollars)

Year	Gross Book Value	Building and Other Structures	Machinery and Equipment
1978	$487.6	$137.4	$350.2
1979	566.2	159.8	406.4
1980	612.1	168.2	443.9
1981	636.0	179.6	456.4
1982	741.6	202.0	539.5
1983	639.1	175.6	463.5
1984	595.2	164.8	430.3
1985	656.5	181.0	475.5
1986	576.3	152.9	423.4
1987	594.5	155.8	438.7

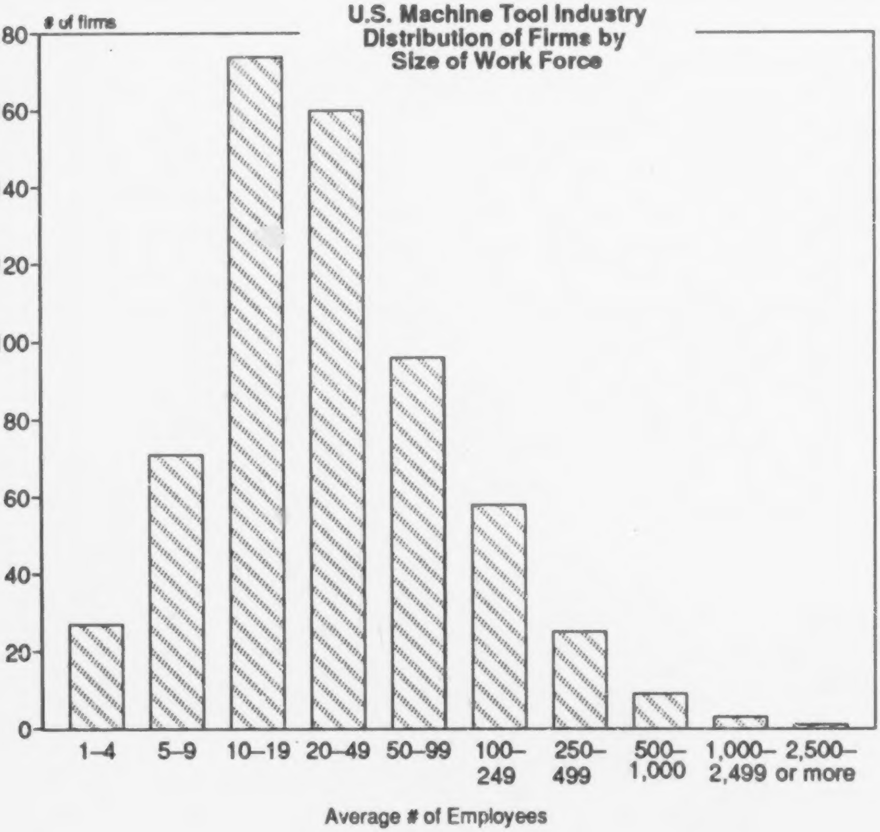
Source: U.S. Bureau of the Census, "Census of Manufactures, 1987; Industry Series: Metalworking Machinery and Equipment MC82-1-35C" and earlier issues; "Annual Survey of Manufactures"

INDUSTRY STATISTICS

Distribution of Firms by Size of Work Force

	Total # Machine Tool Firms	Metal Cutting Industry	Metal Forming Industry
TOTAL	624	417	207
Firms with an average of:			
1 – 4 employees	27	22	5
5 – 9 employees	71	52	19
10–19 employees	174	111	63
20–49 employees	160	111	49
50–99 employees	96	58	38
100–249 employees	58	36	22
250–499 employees	25	17	8
500–999 employees	9	6	3
1,000–2,499 employees	3	3	0
2,500 employees or more	1	1	0

Source: 1987 Census of Manufactures

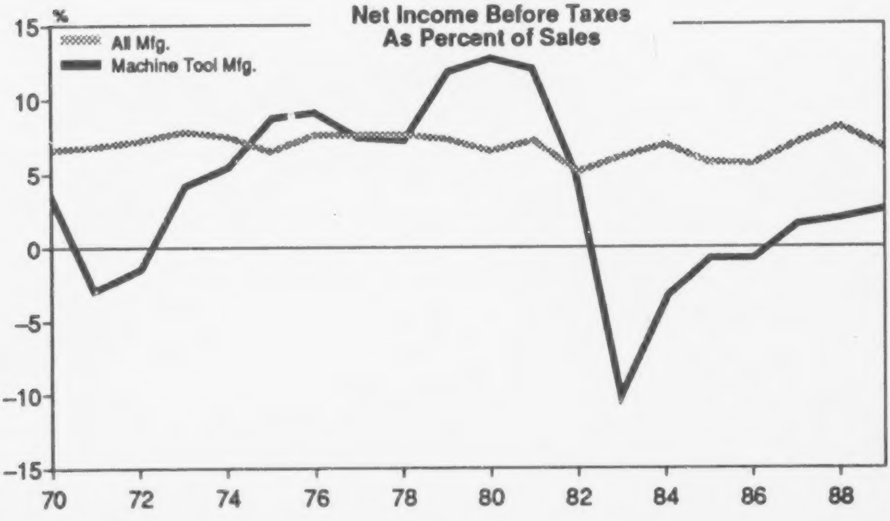


NET INCOME BEFORE TAXES

U.S. Machine Tool Companies

	As Percent of Sales		As Percent of Assets	
Year	All Manufacturers	Machine Tool Manufacturers	All Manufacturers	Machine Tool Manufacturers
1970	6.8%	3.8%	8.3%	4.8%
1971	7.0	–2.7	8.7	–2.7
1972	7.4	–1.3	9.5	–1.4
1973	8.0	4.3	11.0	4.8
1974	7.7	5.6	10.7	7.2
1975	6.7	8.9	8.8	12.7
1976	7.8	9.3	10.6	12.3
1977	7.8	7.6	13.5	12.8
1978	7.8	7.4	10.7	11.8
1979	7.5	12.0	11.1	16.9
1980	6.7	12.9	9.5	19.4
1981	7.4	12.2	10.5	18.0
1982	5.3	5.0	6.7	6.1
1983	6.3	–9.6	7.9	–8.7
1984	7.1	–3.2	8.9	–3.4
1985	5.9	–0.6	7.1	–0.7
1986	5.8	–0.6	6.5	(b)
1987	7.2(a)	1.7	8.0(a)	2.1
1988	8.3(a)	2.1	9.5(a)	2.5
1989	6.9(a)	2.7	7.8(a)	4.6

(a) Excludes corporations with less than $250,000 in assets. (b) Net income before taxes was less than 0.1%.
Sources: U.S. Department of Commerce, Bureau of Census, "Quarterly Financial Report for Manufacturing Corporations" and NMTBA.


Net Income Before Taxes
As Percent of Sales

SELECTED FINANCIAL RATIOS

For Corporations In Selected Industries, 1989

Industry	% Net Operating Income on Net Sales	% Income After Taxes on Net Sales	% Income After Taxes on Avg Net Worth	% Depreciation & Amortization to Net Sales
Machine Tools	3.9%	1.8%	5.1%	2.0%
All Manufacturing Corporations	6.6	5.0	13.8	3.8
Durable Goods	5.0	4.2	11.4	3.7
Primary Iron & Steel	5.1	3.0	22.6	3.4
Primary Nonferrous Metals	9.1	[illegible]	18.8	3.6
Electrical & Electronic Equipment	6.1	4.5	11.4	3.7
Machinery, Except Electrical	3.5	3.8	7.7	4.1
Motor Vehicle & Equipment	2.0	3.8	10.9	3.8
Transportation Equipment (including Motor Vehicles)	2.9	3.6	11.2	3.6
Stone, Clay, and Glass Products	7.3	3.5	10.6	4.3
Nondurable Goods	8.2	5.9	16.2	4.0
Food & Kindred Products	7.8	4.1	16.1	2.5
Textile Mill Products	6.7	2.5	10.5	3.3
Paper & Allied Products	11.2	6.2	15.8	4.4
Chemicals & Allied Products	9.3	8.8	20.0	4.3
Petroleum & Coal Products	7.4	7.3	14.0	7.0
Rubber & Misc. Plastic Products	5.4	3.1	12.7	3.1

Selected Financial Ratios

	% Income After Taxes on Total Assets	Inventory Turnover	Current Ratio
Machine Tools	2.3%	3.4x	1.8x
All Manufacturing Corporations	5.5	6.9	1.5
Durable Goods	4.7	5.6	1.6
Primary Iron & Steel	3.8	6.2	1.7
Primary Nonferrous Metals	8.2	7.5	1.6
Electrical & Electronic Equipment	4.9	5.1	1.5
Machinery, Except Electrical	3.8	5.5	1.8
Motor Vehicle & Equipment	4.7	12.9	1.5
Transportation Equipment (including Motor Vehicles)	4.1	5.1	1.3
Stone, Clay, and Glass Products	3.5	8.4	1.5
Nondurable Goods	6.3	9.0	1.4
Food & Kindred Products	5.3	9.4	1.3
Textile Mill Products	3.7	6.3	2.0
Paper & Allied Products	6.5	9.5	1.7
Chemicals & Allied Products	8.4	7.1	1.4
Petroleum & Coal Products	6.1	13.6	1.0
Rubber & Misc. Plastic Products	4.7	7.4	1.4

x – times; current ratio = current assets to current liabilities. Source: U.S. Department of Commerce, Bureau of Census, "Quarterly Financial Report for Manufacturing Corporations" and NMTBA.

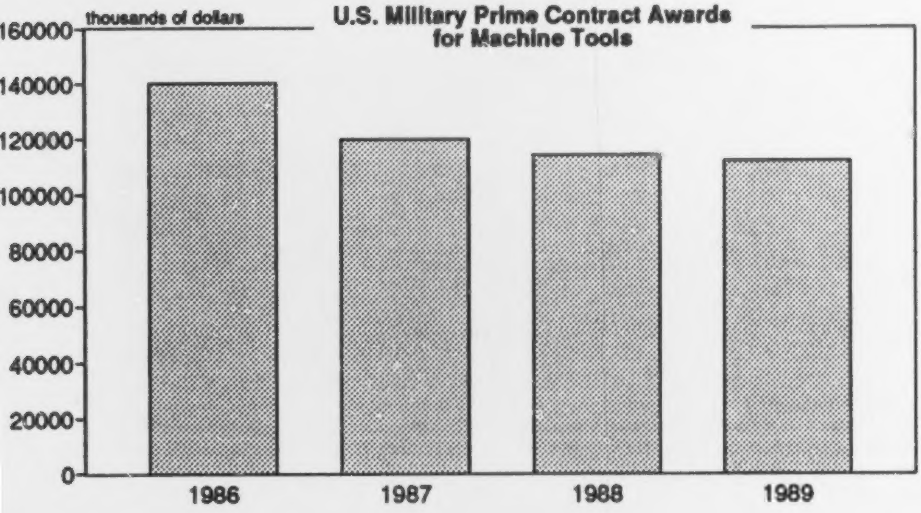
U.S. MILITARY PRIME CONTRACT AWARDS FOR MACHINE TOOLS

Fiscal Years 1986 to Date (Year ending June 30)

(thousands of dollars)

	1986	1967	1988	1989
Saws and filing machines	$ 2,787	$ 4,003	$ 4,087	$ 1,831
Machining centers and way type machines	13,178	23,245	16,333	5,264
Electrical and ultrasonic erosion machines	3,732	3,567	1,187	2,303
Boring machines	12,013	3,935	323	28,676
Broaching machines	1,228	413	117	117
Drilling machines and tapping machines	6,808	2,944	9,969	2,271
Gear cutting and finishing machines	1,236	362	1,307	939
Grinding machines	25,480	20,838	18,149	16,776
Lathes	27,008	25,968	17,052	17,275
Milling machines	12,089	10,094	13,575	9,739
Planers and shapers	374	133	2,509	425
Miscel. machine tools	2,280	3,659	6,109	3,777
Total Metal Cutting Machine Tools	108,213	99,161	90,717	89,393
Bending and forming machines	10,824	9,436	4,590	9,246
Hydraulic and pneumatic presses	3,039	5,457	4,718	507
Mechanical presses, power driven	7,600	865	3,345	3,107
Manual presses	235	463	392	132
Punching and shearing machines	6,811	2,783	7,920	8,262
Forging machinery and hammers	2,753	748	924	553
Wire and metal ribbon forming machines	0	406	200	40
Riveting machines	226	70	314	387
Miscel. secondary forming & cutting mach.	780	561	1,038	404
Total Metal Forming Machine Tools	32,268	20,789	23,441	$22,658
Total Machine Tools	140,481	119,950	114,158	112,051

Source: Department of Defense, OASD (Comptroller), "Military Prime Contract Awards, by Service Category and Federal Supply Classification."

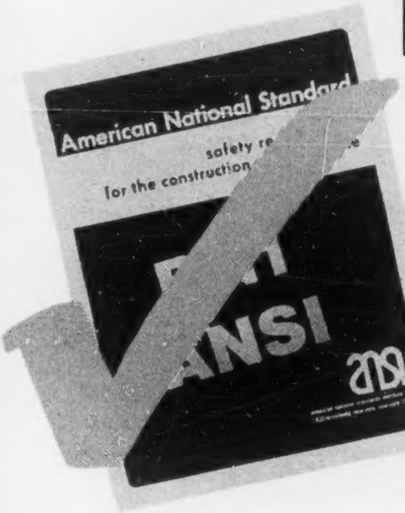


U.S. Military Prime Contract Awards for Machine Tools

ANSI

APPROVED B11

SAFETY STANDARDS FOR MACHINE TOOLS



Whether the job calls for shears, a hydraulic press, or any one of a variety of other types of machine tools, there's an ANSI-approved B11 safety standard available to help reduce injuries and protect workers.

Standards in the B11 series provide specifications for safe construction, care, and use of machine tools. They serve as authoritative guides for employees, manufacturers, and regulatory agencies.

To assist you in providing the safe operation, construction, care and use of machine tools, we suggest you consider using the available B11 standards listed below to help you effectively comply with OSHA 1910.212 and 1910.217.

Approved American National Standards	Designation	
Mechanical Power Presses	B11.1-1988*	
Hydraulic Power Presses	B11.2-1982*	
Power Press Brakes	B11.3-1982*	(R1988)
Shears	B11.4-1983*	
Iron Workers	B11.5-1988*	
Lathes	B11.6-1984*	
Cold Headers and Cold Formers	B11.7-1985*	
Supplement	B11.7a-1987	
Drilling, Milling, and Boring Machines	B11.8-1983*	
Grinding Machines	B11.9-1975*	(R1987)
Metal Sawing Machines	B11.10-1983*	
Gear Cutting Machines	B11.11-1985*	
Roll Forming and Roll Bending Machines	B11.12-1983*	(R1989)
Single- and Multiple-Spindle Automatic Screw/Bar and Chucking Machines	B11.13-1983*	
Coil Slitting Machines/Systems	B11.14-1983	
Pipe, Tube, and Shape Bending Machines	B11.15-1984*	(R1989)
Metal Powder Compacting Presses	B11.16-1988	
Horizontal Hydraulic Extrusion Presses	B11.17-1982	(R1989)
Machinery and Machine Systems for Processing Coiled Strip, Sheet, and Plate	B11.18-1985	
Performance Criteria for the Design, Construction, Care and Operation of Safeguarding When Referenced by the Other B11 Machine Tool Safety Standards	B11.19-1990	

*Adopted for mandatory use by the U.S. Department of Defense.

ORDERING INFORMATION:
NMTBA Members contact Safety Department, NMTBA, 7901 Westpark Dr., McLean, VA 22102, (703) 827-5212.
All others contact Publications Department, ANSI, 1430 Broadway, New York, NY 10018, (212) 642-4900.

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Source for all data in section E: 14th American Machinist Inventory

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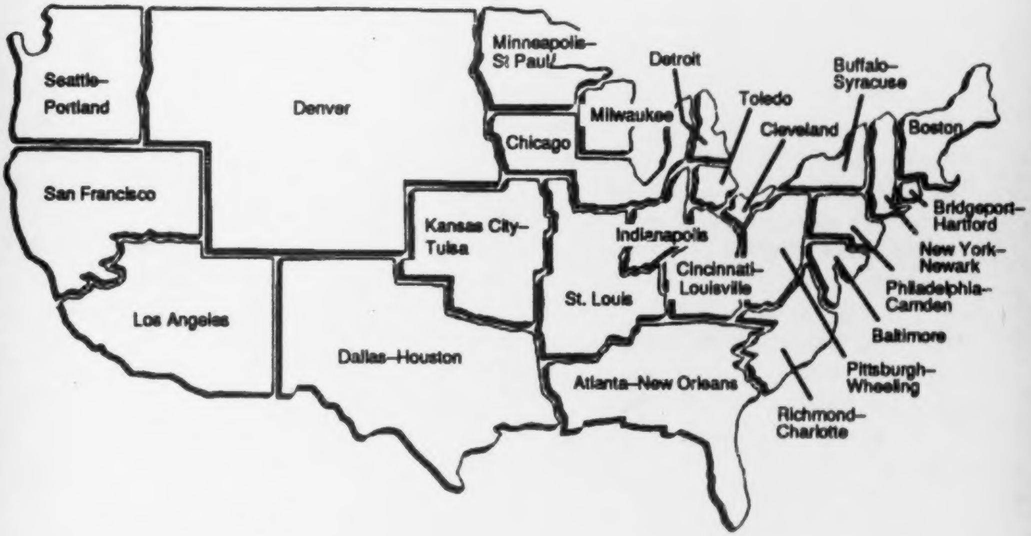
GEOGRAPHICAL DISTRIBUTION OF MACHINE TOOLS IN USE 1989

U.S. Metalworking Industries

	METAL CUTTING		METAL FORMING	
Area	Number	% of total in area	Number	% of total in area
1. Boston	104,799	5.6	23,414	5.1
2. Bridgeport–Hartford	57,266	3.1	13,681	3.0
3. New York–Newark	63,751	3.4	15,605	3.4
4. Buffalo–Syracuse	54,438	2.9	12,919	2.8
5. Philadelphia–Camden	140,483	7.5	37,566	8.2
6. Pittsburgh–Wheeling	42,347	2.3	8,176	1.8
7. Baltimore	15,956	0.9	3,944	0.9
8. Richmond–Charlotte	87,056	4.7	22,605	5.0
9. Atlanta–New Orleans	146,313	7.8	39,049	8.6
10. Cleveland	69,070	3.7	15,521	3.4
11. Toledo	21,653	1.2	5,997	1.3
12. Cincinnati–Louisville	65,054	3.5	14,792	3.2
13. Detroit	89,230	4.8	17,687	3.9
14. Indianapolis	45,786	2.4	10,450	2.3
15. Chicago	214,174	11.4	54,059	11.9
16. Milwaukee	67,795	3.6	17,777	3.9
17. Minneapolis–St Paul	45,362	2.4	12,281	2.7
18. St Louis	60,185	3.2	17,068	3.7
19. Kansas City–Tulsa	45,455	2.4	10,099	2.2
20. Dallas–Houston	94,821	5.1	21,436	4.7
21. Denver	43,379	2.3	10,129	2.2
22. Seattle–Portland	40,712	2.2	8,602	1.9
23. San Francisco	71,579	3.8	20,065	4.4
24. Los Angeles	184,089	9.8	43,106	9.5
Total	1,870,753	100.0	456,028	100.0

Source: 14th American Machinist Inventory


Seattle–Portland
Denver
Minneapolis–St Paul
Detroit
Buffalo–Syracuse
Toledo
Milwaukee
Cleveland
Boston
Chicago
San Francisco
Kansas City–Tulsa
Indianapolis
Bridgeport–Hartford
New York–Newark
Cincinnati–Louisville
St. Louis
Philadelphia–Camden
Los Angeles
Baltimore
Dallas–Houston
Atlanta–New Orleans
Pittsburgh–Wheeling
Richmond–Charlotte

AGE DISTRIBUTION OF MANUFACTURING TECHNOLOGY IN USE 1989

U.S. Metalworking Industries

Type of equipment	Total Units	0–4 Years	5–9 Years	10–19 Years	20+ Years
METALCUTTING MACHINES	1,870,753	292,163	449,681	640,864	488,045
NC Turning Machines	74,077	30,949	26,048	14,999	2,081
Non–NC Turning Machines	330,357	28,526	52,497	121,836	127,498
NC Boring Machines	10,688	2,917	3,376	3,039	1,356
Non–NC Boring Machines	37,372	2,688	6,239	14,449	13,996
NC Drilling Machines, all types	10,383	2,921	2,823	3,459	1,180
Non–NC Drilling Machines	274,623	31,103	60,017	100,811	82,692
NC Machining Centers (w/ATC)	53,585	23,813	19,548	8,729	1,495
NC Milling Machines	28,260	10,064	11,357	5,771	1,068
Non–NC Milling Machines	220,846	27,354	53,609	82,434	57,399
NC Gear Cutting Machines	804	443	98	89	174
Non–NC Gear Cutting & Finishing Machines	28,705	911	1,994	10,553	15,247
NC Grinding Machines	12,747	5,285	3,341	3,111	1,010
Non–NC Grinding Machines	422,100	57,791	104,487	148,143	111,679
Honing, Lapping, Polishing Machines	48,537	5,157	13,369	19,727	10,284
Station–type Metalcutting Machines	13,250	1,799	3,936	5,484	2,031
Broaching Machines, All Types	16,698	1,785	2,645	5,335	6,933
Tapping Machines	31,950	4,285	10,323	10,511	6,831
Threading Machines (not mill, grind, roll)	9,533	1,218	1,428	3,462	3,425
Cutoff & Sawing Machines	204,654	40,900	60,754	67,147	35,853
Waterjet Machines	1,255	178	207	850	20
NC Laser & Thermal Cutting Machines	4,467	2,550	1,329	483	105
Non–NC Thermal Cutting Mach. (incl plasma)	6,173	2,812	1,359	1,468	534
Electrical Machining Units	19,036	5,894	6,340	5,502	1,300
All Other NC Metalcutting Machines	2,061	289	708	722	342
All Other Non–NC Metalcutting Machines	8,592	531	1,849	2,700	3,512
METAL FORMING MACHINE TOOLS	456,028	51,593	94,847	171,002	138,586
NC Punching & Shearing Machines	9,830	4,015	3,440	2,014	361
Non–NC Punching & Shearing Machines (power)	76,260	8,965	15,188	29,061	23,046
NC Bending & Forming Machines, All Types	7,195	3,118	2,386	1,183	508
Non–NC Bending & Forming Mach. (power)	81,608	8,177	18,435	32,995	22,001
Mechanical Presses(power)(not forge)	150,570	9,870	21,426	61,046	58,228
Hydraulic Presses (not forge)	49,691	7,406	13,635	17,957	10,693
Pneumatic Presses	24,889	3,960	9,031	7,953	3,945
Coil–processing Systems	13,333	1,295	3,454	5,031	3,553
Sheet– and Plate–processing Systems	1,321	242	475	369	235
Forging Machines	15,736	1,266	1,776	3,992	8,702
Die Casting Machines (hot & cold chamber)	3,179	421	1,124	1,004	630
Multiple–slide Forming Machines	6,525	913	1,310	2,398	1,904
Thread–rolling Machines	6,902	729	968	2,521	2,684
All Other NC Metalforming Machines	863	381	175	166	141
All Other Non–NC Metalforming Machines	8,126	835	2,024	3,312	1,955

continued

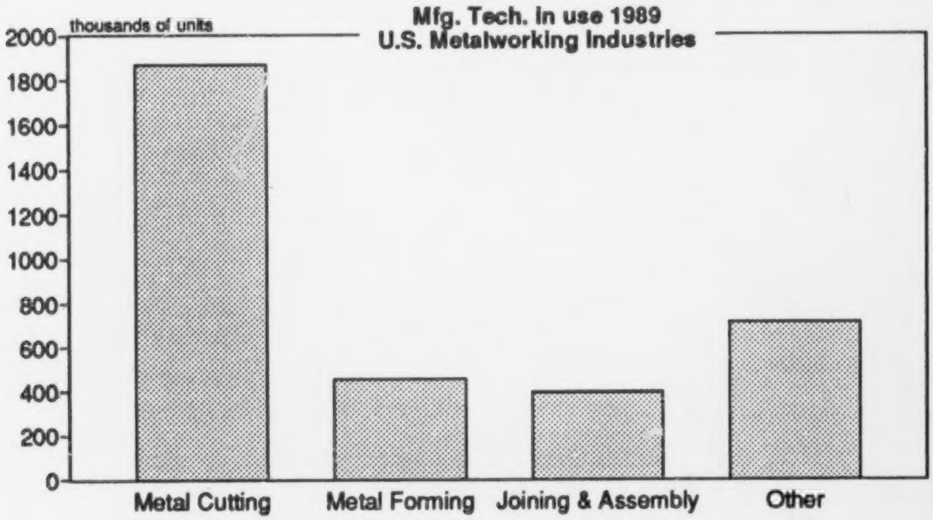
AGE DISTRIBUTION OF MANUFACTURING TECHNOLOGY IN USE 1989

U.S. Metalworking Industries

continued

Type of equipment	Total Units	0–4 Years	5–9 Years	10–19 Years	20+ Years
JOINING & ASSEMBLY EQUIPMENT	395,273	83,208	135,951	122,287	53,827
Auto Assembly Machines	21,718	7,875	7,233	4,409	2,201
Riveting Machines (not portable)	26,792	3,467	6,874	10,489	5,962
Electric Arc Welding Equipment	245,733	54,113	92,722	75,247	23,651
Electric Resistance Welding Equipment	64,911	9,885	16,058	21,324	17,644
Energy Beam Welding	1,454	623	321	467	43
Gas Welding Machines (not hand)	7,116	1,750	2,716	2,137	513
Brazing Systems (all types, incl. furnaces)	20,092	3,654	7,264	5,778	3,396
Metallizing Equipment (gas & plasma)	7,457	1,841	2,763	2,436	417
OTHER EQUIPMENT	712,217	349,926	198,763	116,624	46,904
Plastic Molding Machines	25,725	5,652	8,114	8,928	3,031
Inspection & Measuring Machines	98,533	28,701	34,736	25,844	9,252
Heat Treating Equipment	47,845	7,470	11,442	17,956	10,977
Baking & Drying Ovens	45,426	9,512	15,456	15,342	5,116
Cleaning & Finishing Equipment	152,102	36,828	53,859	44,197	17,218
Robots	13,126	7,984	4,023	682	437
Computer Workstations	329,460	253,779	71,133	3,675	873

Source: 14th American Machinist Inventory



DISTRIBUTION OF MANUFACTURING TECHNOLOGY EQUIPMENT, 1989
by User Plant Size

		# of Employees			
Type of equipment	Total Units	1–19	20–99	100–499	500 or more
TOTAL METAL CUTTING MACHINES	1,870,753	23%	45%	21%	11%
NC turning machines	74,077	16	42	26	16
Non–NC turning machines	330,357	22	45	21	11
NC boring machines	10,688	13	32	29	26
Non–NC boring machines	37,372	20	47	21	12
NC drilling machines	10,383	19	39	28	15
Non–NC drilling machines	274,623	24	45	21	11
NC machining centers	53,585	16	50	22	11
NC milling machines	28,260	26	42	15	17
Non–NC milling machines	220,846	25	48	19	8
NC gear–cutting machines	804	22	21	45	12
Non–NC gear cut & finish machines	28,705	13	50	31	6
NC grinding machines	12,747	21	37	24	17
Non–NC grinding machines	422,100	24	44	22	10
Honing, lapping, polishing machines	48,537	20	43	22	14
Station–type metalcutting machines	13,250	17	21	20	43
Broaching machines	16,698	16	46	24	15
Tapping machines	31,950	29	43	20	7
Threading machines	9,533	23	47	22	8
Cutoff & sawing machines	204,654	28	43	18	10
Waterjet machines	1,255	7	73	9	10
NC laser and thermal cutting units	4,467	27	40	25	8
Non–NC thermal cutting machines	6,173	23	57	15	5
Electrical machining units	19,036	22	42	17	20
Other NC metalcutting machines	2,061	11	37	41	11
Other non–NC metalcutting machines	8,592	22	42	36	0
TOTAL METAL FORMING MACHINES	456,028	23	41	26	10
NC punching & shearing machines	9,830	21	40	25	14
Non–NC punching & shearing machines	76,260	27	45	20	8
NC bending & forming machines	7,196	16	46	20	18
Non–NC bending & forming machines	81,606	27	42	21	11
Mechanical presses	150,570	22	40	29	9
Hydraulic presses	49,691	25	41	25	9
Pneumatic presses	24,889	25	41	25	10
Coil–processing systems	13,333	25	36	27	12
Sheet– & plate–processing systems	1,321	21	21	42	16
Forging machines	15,736	10	31	34	25
Die casting machines	3,179	26	31	34	9
Multiple–slide forming machines	6,525	19	52	21	8
Thread–rolling machines	6,902	8	43	34	15
Other NC metalforming machines	863	43	31	20	6
Other non–NC metalforming machines	8,126	18	34	41	7
Total NC cutting machines	204,468	18	43	23	16
Total NC forming machines	17,888	20	42	23	15
Total NC machine tools	222,356	18	43	23	16
TOTAL MACHINE TOOLS	2,326,781	23	44	22	11

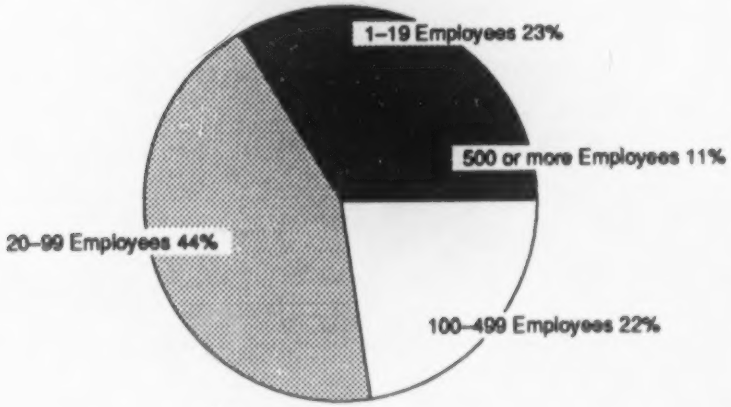
continued

DISTRIBUTION OF MANUFACTURING TECHNOLOGY EQUIPMENT, 1989
by User Plant Size

Type of equipment	Total Units	# of Employees 1–19	20–99	100–499	500 or more
continued					
TOTAL JOINING & ASSEMBLY EQUIPMENT	395,273	20%	42%	27%	11%
Automatic assembly machines	21,718	9	25	43	23
Riveting machines	26,792	12	35	40	13
Electric Arc Welding Equipment	245,733	21	47	25	7
Electric Resistance Welding Equip	64,911	21	35	26	19
Energy beam welding	1,454	11	19	27	43
Gas welding machines	7,116	24	35	31	10
Brazing systems	20,092	25	36	31	8
Metallizing equipment	7,457	24	37	18	21
OTHER EQUIPMENT	712,217	12	29	23	36
Plastic molding machines	25,725	14	34	42	11
Inspection & measuring machines	98,533	16	40	28	16
Heat treating equipment	47,845	14	37	27	22
Baking & drying ovens	45,426	14	36	34	15
Cleaning & finishing equipment	152,102	21	40	26	13
Robots	13,126	13	36	28	24
Computer workstations	329,460	6	18	17	59

Source: 14th American Machinist Inventory

Distribution of Machine Tools by Size of User Company

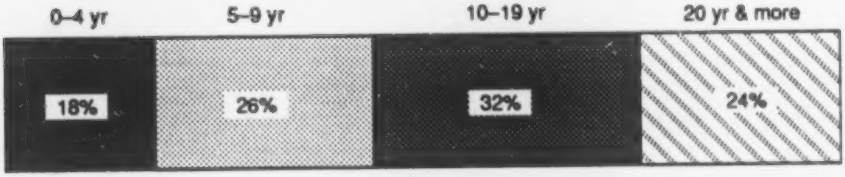


DISTRIBUTION OF MANUFACTURING TECHNOLOGY IN USE, 1989
by Age and Plant Size

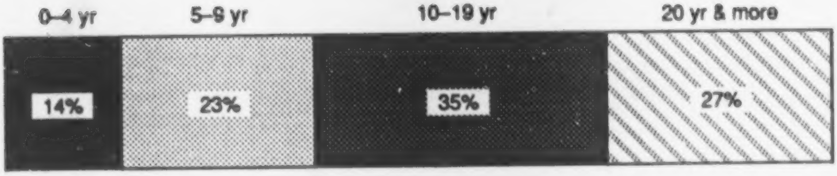
Type of equipment	Total Units	0–4 yr	5–9 yr	10–19 yr	20 yr & up
Plants with 1–19 employees					
Total metal cutting machines	433,902	20%	26%	31%	24%
Total metal forming machines	106,576	13	27	36	24
Total NC cutting machines	36,430	44	34	17	4
Total NC forming machines	3,575	50	31	14	4
Total NC machine tools	40,005	45	34	17	4
Total machine tools	540,478	18	26	32	24
Total joining & assembly	78,646	27	30	30	13
Total other equipment	86,027	39	32	20	9
Total equipment	705,151	22	27	30	21
Plants with 20–99 employees					
Total metal cutting machines	833,994	15%	24%	35%	26%
Total metal forming machines	186,612	11	19	37	33
Total NC cutting machines	88,346	39	35	22	4
Total NC forming machines	7,559	44	29	21	6
Total NC machine tools	95,905	40	35	21	4
Total machine tools	1,020,606	14	23	35	27
Total joining & assembly	166,914	21	34	32	13
Total other equipment	208,037	41	29	22	9
Total equipment	1,395,557	19	25	33	23
Plants with 100–499 employees					
Total metal cutting machines	396,818	13%	24%	36%	27%
Total metal forming machines	116,760	10	20	42	29
Total NC cutting machines	47,767	37	35	22	6
Total NC forming machines	4,056	31	43	20	6
Total NC machine tools	51,823	37	36	21	6
Total machine tools	513,578	12	23	37	28
Total other equipment	164,524	38	34	22	7
Total equipment	786,271	18	27	33	21
Plants with 500 or more employees					
Total metal cutting machines	206,039	15%	23%	36%	26%
Total metal forming machines	46,080	12	16	31	41
Total NC cutting machines	31,925	43	34	21	2
Total NC forming machines	2,698	42	37	17	5
Total NC machine tools	34,623	43	34	21	2
Total machine tools	252,119	15	22	35	29
Total joining & assembly	41,544	16	30	32	23
Total other equipment	253,529	67	22	8	4
Total equipment	547,292	39	23	22	17

DISTRIBUTION OF MACHINE TOOLS IN USE, 1989
by Age and Plant Size

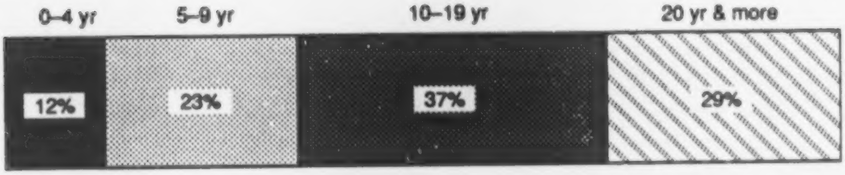
Plants with 1–19 Employees



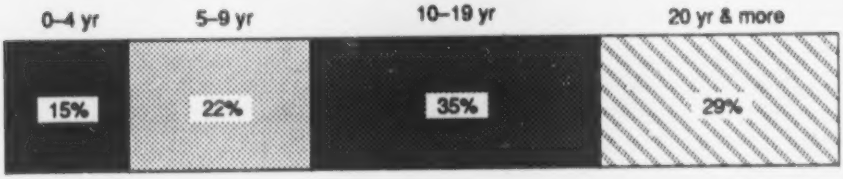
Plants with 20–99 Employees



Plants with 100–499 Employees



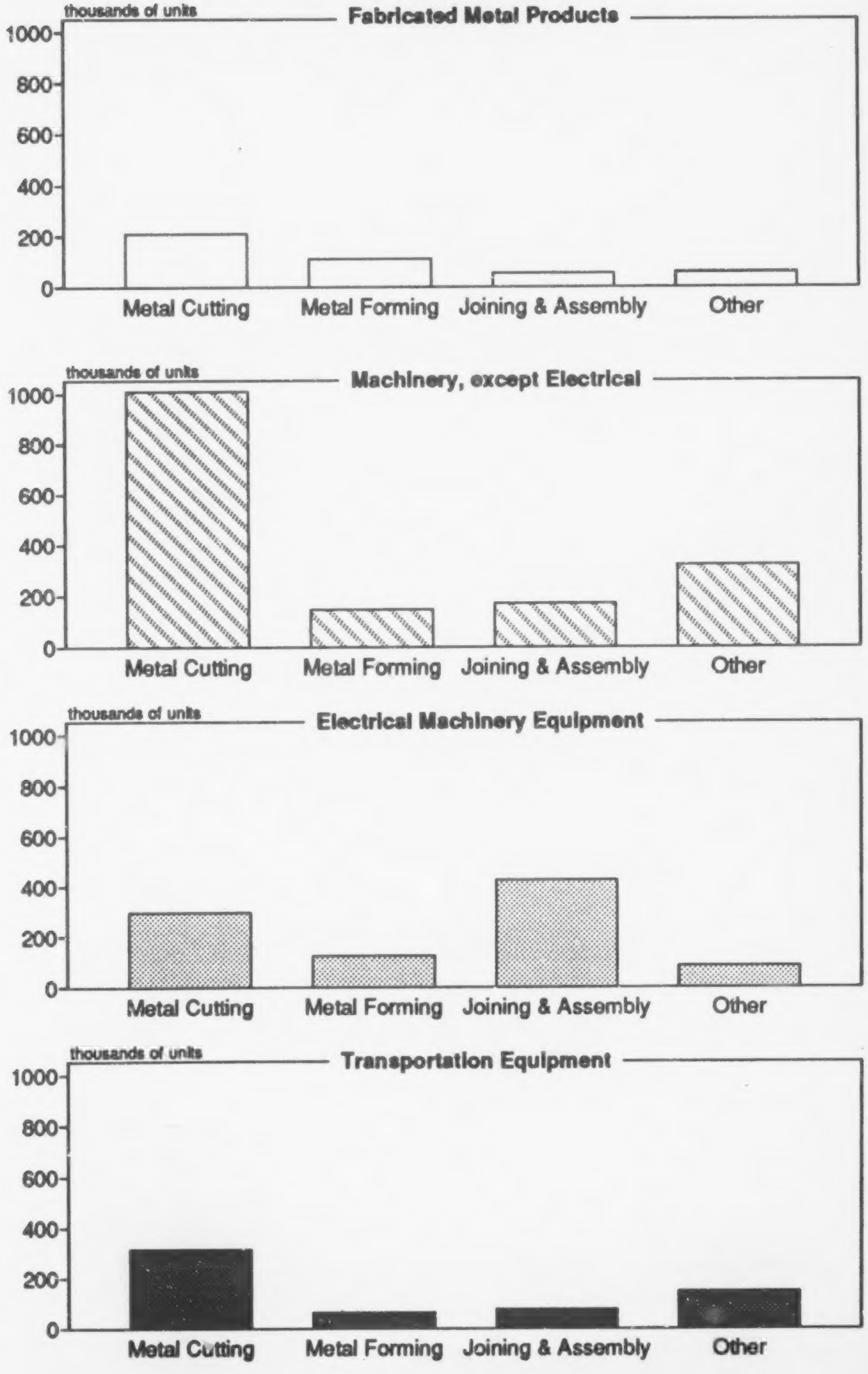
Plants with 500 or More Employees



DISTRIBUTION OF MANUFACTURING TECHNOLOGY, 1989
by Industry

SIC	Industry	Metal Cutting	Metal Forming	Joining & Assembly	Other Equipment
25	METAL FURN, FIXTURES	6,043	5,186	4,182	2,199
33	PRIMARY METALS	5,957	2,174	1,205	2,350
34	FABRICATED METAL PRODUCTS	210,863	109,836	54,090	58,129
341	Cans & Shipping Containers	2,019	2,013	1,105	888
342	Cutlery, handtools, hdwr	28,183	12,838	6,416	7,670
343	Heating, plumbing fxtrs	4,776	2,212	1,192	1,405
344	Fab Structural metal pdts	55,706	36,036	27,306	11,585
345	Screw Machine Products	37,731	11,127	1,590	8,107
346	Metal Stampings	31,240	28,492	6,530	10,243
347	Coating and Engraving	5,532	770	1,147	3,961
348	Ordnance accessories	3,524	565	426	1,004
349	Misc fab metal products	39,369	15,266	7,967	10,865
35	MACHINERY EXCEPT ELECTRICAL	1,011,582	145,427	170,148	319,780
351	Engines and turbines	10,146	1,138	1,133	4,062
352	Farm, garden Machinery	33,999	12,873	18,563	13,332
353	Contruction, mining, matl hdlg	77,443	15,846	33,561	18,291
354	Metalworking machinery	221,868	18,955	13,163	39,717
355	Special–industry machy	103,958	13,161	16,112	18,868
356	General industrial machy	154,921	21,780	24,500	41,730
357	Office, computing machy	64,036	10,625	12,445	31,902
358	Refrig, service machy	49,120	16,431	14,889	8,433
359	Misc machy, except elec	239,859	19,938	21,690	37,247
36	ELECTRICAL MACHINERY, EQPMT	238,464	126,744	425,208	83,746
361	Trnsfrmr, distbtn eqpmt	23,851	9,938	6,430	7,032
362	Elec industrial apparatus	48,799	13,855	10,481	19,936
363	Household appliances	12,052	11,214	7,714	8,282
364	Elec lighting, wiring	34,219	14,670	7,865	15,172
365	Radio, TV Equipment	33,602	33,495	12,150	10,609
366	Communications Eqpmt	41,444	11,543	9,567	48,585
367	Electronic Components	60,044	19,457	11,887	37,711
369	Misc electrical eqpmt	26,102	9,702	8,765	13,569
37	TRANSPORTATION EQUIPMENT	315,648	63,345	77,893	148,336
371	Motor vehicles and parts	115,141	31,198	33,414	29,582
372	Aircraft and parts	130,962	17,953	15,638	97,368
373	Ships and boats	28,760	7,882	18,181	8,351
374	Railroad Eqpmt	13,505	1,417	2,383	2,212
375	Mtrcycles, bicycles, parts	1,699	1,329	1,017	866
376	Guided missiles, space veh	5,361	452	686	2,057
379	Misc transportation eqpmt	6,406	996	2,049	740
38	PRECISION INSTRUMENTS	20,715	2,967	2,937	11,947
39	MISC MFG INDUSTRIES	1,481	349	442	1,521
TOTAL		1,870,753	456,028	395,273	712,217

DISTRIBUTION OF MANUFACTURING TECHNOLOGY, 1989
by Industry

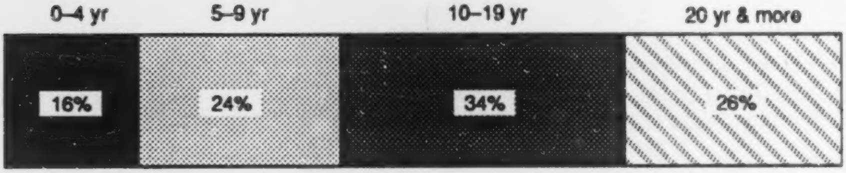


AGE OF MANUFACTURING TECHNOLOGY, 1989
by Industry and Age, 1989

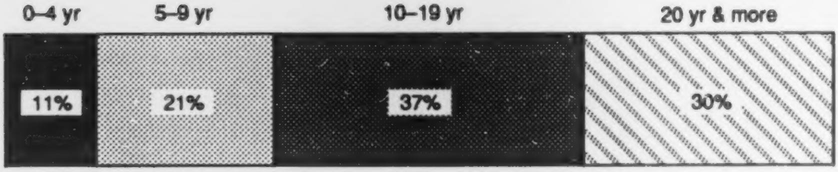
SIC	Industry	Total Units	0–4 yr	5–9 yr	10–19 yr	20 yr & up
	Metal Cutting Machine Tools In Use, 1989					
25	Metal furn, fixtures	6,043	1%	2%	76%	21%
33	Primary metals	5,957	14	21	32	33
34	Fabricated metal products	210,863	15	22	34	29
35	Machinery, except electrical	1,011,582	15	24	34	27
36	Electrical machy, eqpmt	298,464	19	27	34	20
37	Transportation equipment	315,648	15	24	35	26
38	Precision instruments	20,715	14	31	32	24
39	Misc mfg industries	1,481	16	14	50	20
Total		1,870,753	16	24	34	26
	Metal Forming Machine Tools In Use, 1989					
25	Metal furn, fixtures	5,186	3%	2%	66%	29%
33	Primary metals	2,174	7	21	54	19
34	Fabricated metal products	109,836	10	16	40	35
35	Machinery, except electrical	145,427	13	21	35	31
36	Electrical machy, eqpmt	126,744	13	26	37	24
37	Transportation equipment	63,345	8	20	36	36
38	Precision instruments	2,967	5	34	37	24
39	Misc mfg industries	349	5	6	42	47
Total		456,028	11	21	37	30
	Joining and Assembly Machines In Use, 1989					
25	Metal furn, fixtures	4,812	1%	5%	22%	73%
33	Primary metals	1,205	20	34	43	2
34	Fabricated metal products	54,090	20	31	33	16
35	Machinery, except electrical	170,148	21	36	32	11
36	Electrical machy, eqpmt	83,746	24	33	28	41
37	Transportation equipment	77,893	19	38	30	13
38	Precision instruments	2,937	15	39	33	13
39	Misc mfg industries	442	15	25	43	17
Total		395,273	21	34	31	14
	Other Equipment In Use, 1989					
25	Metal furn, fixtures	2,129	11%	66%	6%	16%
33	Primary metals	2,350	27	23	22	27
34	Fabricated metal products	58,129	33	27	27	13
35	Machinery, except electrical	319,780	53	27	14	6
36	Electrical machy, eqpmt	168,025	39	36	19	7
37	Transportation equipment	148,336	62	19	14	5
38	Precision instruments	11,947	30	50	16	4
39	Misc mfg industries	1,521	56	18	22	5
Total		712,217	49	28	16	7

AGE OF MANUFACTURING TECHNOLOGY IN USE 1989

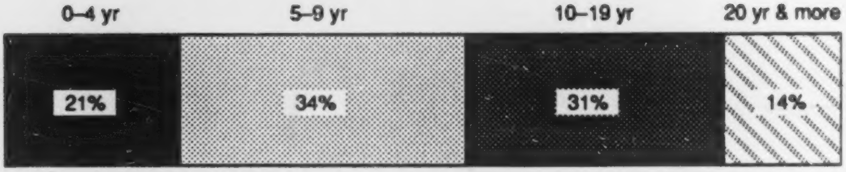
Metal Cutting Machine Tools in Use, 1989



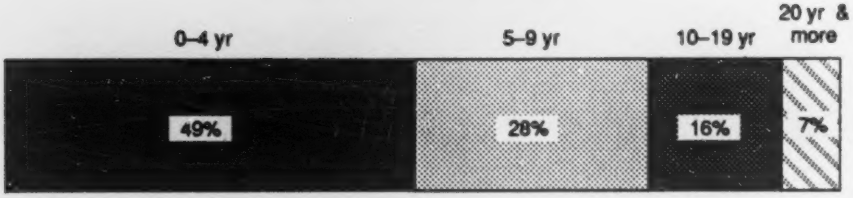
Metal Forming Machine Tools in Use, 1989



Joining & Assembly Machines in Use, 1989



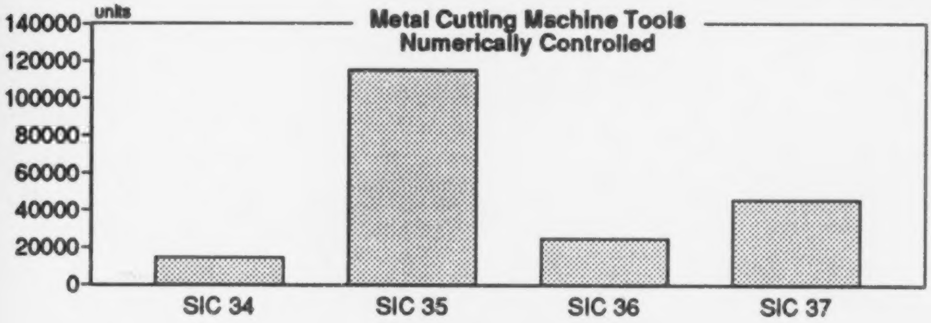
Other Equipment in Use, 1989



NUMERICALLY CONTROLLED MACHINE TOOLS IN USE, 1989

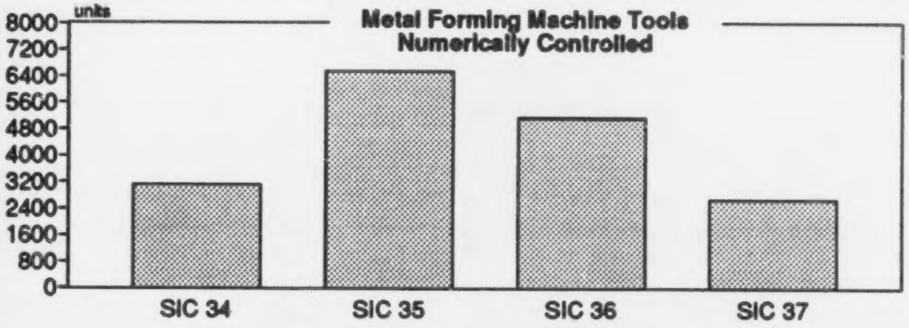
Metal Cutting Machine Tools

SIC	Industry	Total Units	NC Units	% NC of Total	% NC 0–9 yr
25	Metal furn, fixtures	6,043	50	0.8%	23.5%
33	Primary metals	5,957	374	6.3	18.3
34	Fabricated metal products	210,863	14,899	7.1	19.1
35	Machinery, except electrical	1,011,582	115,432	11.4	29.3
36	Electrical machy, eqpmt	298,464	25,055	8.4	18.3
37	Transportation equipment	315,648	45,865	14.5	37.7
38	Precision instruments	20,715	2,713	13.1	29.3
39	Misc mfg industries	1,481	80	5.4	17.9
Total		1,870,753	204,468	10.9	27.6



Metal Forming Machine Tools

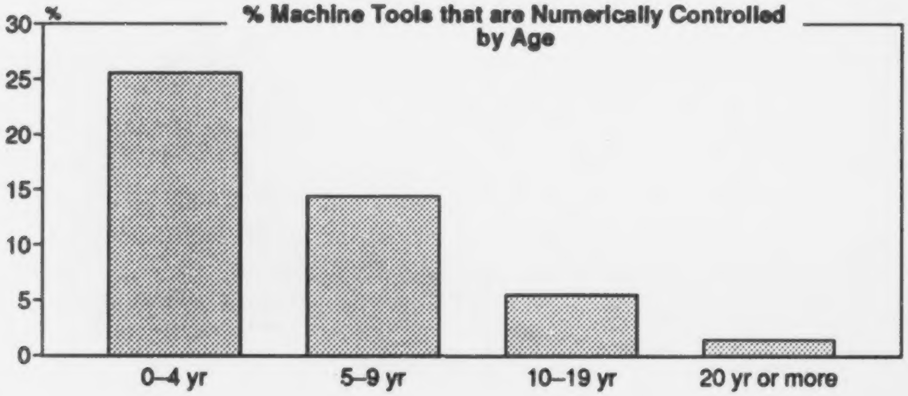
SIC	Industry	Total Units	NC Units	% NC of Total	% NC 0–9 yr
25	Metal furn, fixtures	5,186	205	4.0%	83.0%
33	Primary metals	2,174	2	0.1	0.3
34	Fabricated metal products	109,836	3,130	2.8	11.1
35	Machinery, except electrical	145,427	6,558	4.5	13.2
36	Electrical machy, eqpmt	126,744	5,153	4.1	10.5
37	Transportation equipment	63,345	2,698	4.3	15.2
38	Precision instruments	2,967	134	4.5	11.5
39	Misc mfg industries	349	8	2.3	21.1
Total		456,028	17,888	3.9	12.2

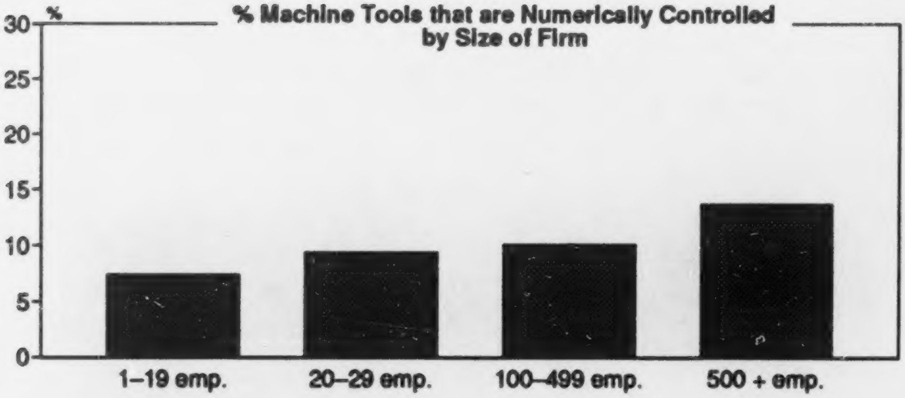


PERCENTAGE OF MACHINE TOOLS THAT ARE NUMERICALLY CONTROLLED

by Age of Machine and Size of Firm

Size of Firm (# of Employees)	%of All Machines	0–4 yrs	5–9 yrs	10–19 yrs	20 yrs or more
1 – 19	7.4%	18.1%	9.7%	4.0%	1.3%
20 – 29	9.4	26.0	14.3	5.7	1.5
100 – 499	10.1	30.3	15.8	5.8	2.3
500 +	13.7	40.7	21.6	8.1	1.1
All Firms	9.6	25.6	14.4	5.5	1.5





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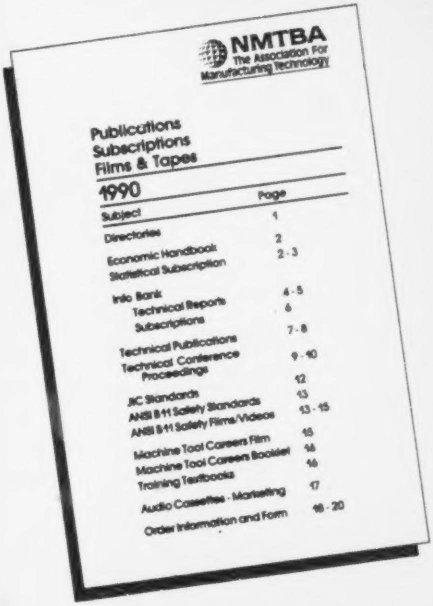

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Section Note:
Foreign data in this section have been converted into U.S. dollars based on annual average exchange rates. However, because the value of the dollar has risen and fallen sharply in recent years, dollar–denominated figures may show declines (increases) when national currency figures reflect increases (declines). Therefore, when analyzing long term trends it might be advisable to convert dollar–denominated statistics back into national currency terms.

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WORLD MACHINE TOOL PRODUCTION AND TRADE

1989 (estimated)

(millions of U.S. dollars)

	Production			Trade		
	Total	Cutting	Forming	Export	Import	Consumption
1. Japan	$9,816.9	$8,041.9	$1,775.0	$3,765.4	$481.1	$6,532.6
2. West Germany	6,859.7	4,624.6	2,235.1	4,331.9	1,399.6	3,927.4
3. Soviet Union [1] E	5,000.0	4,200.0	800.0	380.0	2,000.0	6,620.0
4. United States	3,270.0	2,375.0	895.0	945.0	2,445.0	4,770.0
5. Italy	3,067.3	2,217.8	849.5	1,537.3	845.2	2,375.2
6. Switzerland	1,797.6	1,440.6	357.0	1,589.8	440.3	648.1
7. United Kingdom	1,597.4	1,251.4	346.0	627.7	837.7	1,807.4
8. East Germany [1]	1,445.3	1,165.0	280.3	1,269.8	299.5	475.0
9. France	1,081.4	830.7	250.8	470.2	1,097.1	1,708.3
10. Taiwan	1,016.4	788.6	227.8	667.8	374.2	722.8
11. China [1]	823.6	614.0	209.6	190.0	530.0	1,163.6
12. Spain	795.1	603.5	191.6	325.0	349.4	819.5
13. South Korea	760.6	597.7	162.9	76.0	760.0	1,444.6
14. Romania [1] E	708.8	618.9	89.9	187.7	115.5	636.6
15. Yugoslavia	602.1	401.2	200.9	405.0	153.7	350.8
16. Brazil	458.0	354.0	104.0	24.0	35.0	469.0
17. Czechoslovakia [1] E	450.0	400.0	50.0	219.3	170.2	400.9
18. Sweden	403.4	147.4	256.0	225.0	310.3	488.7
19. Canada	383.0	242.5	140.5	193.4	676.9	866.5
20. Poland E	320.0	265.0	55.0	120.0	250.0	450.0
21. Austria	302.5	260.1	42.3	363.0	529.3	468.8
22. India E	262.8	152.8	110.0	35.0	145.0	372.8
23. Belgium	194.4	27.0	167.4	372.0	411.8	234.2
24. Bulgaria [1] E	175.0	160.0	15.0	138.7	93.4	129.7
25. Hungary [1]	124.0	101.5	22.5	96.0	60.2	88.2
26. Denmark	72.5	51.3	21.2	61.6	99.2	110.1
27. Netherlands	66.5	33.5	33.0	156.6	251.4	161.3
28. Singapore	47.9	43.2	4.7	35.8	40.7	52.8
29. Finland E	41.0	6.0	35.0	40.0	110.0	111.0
30. Argentina	38.5	30.1	8.4	30.5	33.0	41.0
31. Mexico	20.9	13.5	7.4	10.2	203.2	213.9
32. Portugal E	17.5	7.0	10.5	c10.0	35.0	42.5
33. Australia	15.8	11.1	4.7	7.9	83.8	91.7
34. Hong Kong	12.2	6.1	6.1	0.3	8.6	20.5
35. South Africa	9.5	5.3	4.2	0.2	66.8	76.1
TOTAL	42,057.6	32,088.3	9,969.3	18,908.1	15,742.1	38,891.6

---

[1] Countries with controlled currencies. Conversions as follows: the Soviet Union, Bulgaria, Czechoslovakia and Poland at 70% of the official rate; GDR at 65% of the FRG rate; Hungary, PRC (China), and Romania at IMF commercial rates. All free-market currencies have been converted at rates in effect for the period covered. Source: Penton Publishing Inc., American Machinist. Individual items may not add to totals due to rounding.

Notes: Whenever possible, data include machine tools only, excluding parts and attachments.

WORLD MACHINE TOOL PRODUCTION AND TRADE

1988 (revised)

(millions of U.S. dollars)

	Production			Trade		
	Total	Cutting	Forming	Export	Import	Consumption
1. Japan	$8,722.5	$6,875.3	$1,847.2	$3,258.9	$381.9	$5,845.5
2. West Germany	6,572.1	4,729.0	1,843.2	4,069.6	1,266.9	3,769.4
3. Soviet Union [1][E]	4,263.1	3,481.1	782.0	380.2	1,923.1	5,806.0
4. Italy	2,639.1	1,876.2	762.9	1,309.2	706.1	2,036.0
5. United States	2,519.0	1,653.3	865.8	768.3	2,058.7	3,809.4
6. Switzerland	1,865.0	1,512.3	352.6	1,626.5	383.4	621.9
7. United Kingdom	1,501.4	1,198.7	302.7	687.8	732.7	1,546.3
8. East Germany [1][E]	1,457.0	1,170.7	286.3	1,298.4	285.0	443.6
9. France	876.2	664.1	212.1	396.1	971.1	1,451.2
10. Taiwan	782.5	609.0	173.6	504.7	338.7	616.5
11. China [1]	750.6	541.6	209.0	131.1	570.8	1,190.3
12. Spain	702.2	527.0	175.3	260.2	311.6	753.6
13. Romania [1][E]	663.8	579.8	84.0	167.9	123.3	619.2
14. South Korea	632.4	482.9	149.4	57.0	609.3	1,184.7
15. Yugoslavia	550.1	367.4	182.7	403.4	154.6	301.3
16. Brazil	536.0	414.0	122.0	29.0	40.0	547.0
17. Czechoslovakia [1][E]	450.0	400.0	50.0	266.5	189.7	373.2
18. Sweden	359.1	138.7	220.3	213.8	340.4	485.7
19. Canada	344.4	212.2	132.2	98.2	732.4	978.6
20. Poland [1][E]	320.0	265.0	55.0	119.1	233.5	434.4
21. India [E]	290.1	178.1	112.0	35.0	145.0	400.1
22. Austria	247.7	213.0	34.7	299.5	454.6	402.8
23. Belgium	207.2	28.6	178.6	287.0	353.5	273.7
24. Bulgaria [1][E]	195.5	176.0	19.6	157.0	123.1	161.6
25. Hungary [1][E]	134.1	114.5	19.6	93.6	61.0	101.5
26. Denmark	78.0	52.0	26.0	64.6	109.2	122.6
27. Netherlands	66.6	33.3	33.3	147.3	247.5	166.8
28. Argentina	48.6	36.9	11.7	32.6	44.6	60.6
29. Finland [E]	42.7	6.3	36.4	39.9	111.3	114.1
30. Singapore	41.8	37.8	4.1	29.2	30.5	43.1
31. Mexico	20.7	12.9	7.8	11.4	176.7	186.0
32. Portugal [E]	19.2	7.7	11.5	9.6	34.0	43.6
33. Australia	12.2	8.6	3.6	6.8	70.2	75.6
34. Hong Kong	12.2	6.1	6.2	0.3	11.7	23.6
35. South Africa	11.5	6.6	4.9	0.2	77.4	88.7
TOTAL	37,934.6	28,616.7	9,317.9	17,259.9	14,403.5	35,078.2

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[1] Countries with controlled currencies. Conversions as follows: the Soviet Union, Bulgaria, Czechoslovakia and Poland at 70% of the official rate; GDR at 65% of the FRG rate; Hungary, PRC (China), and Romania at IMF commercial rates. All free–market currencies have been converted at rates in effect for the period covered. Source: Penton Publishing Inc., American Machinist. Individual items may not add to totals due to rounding.

Notes: Whenever possible, data include machine tools only, excluding parts and attachments.

LEADING WORLD MACHINE TOOL CONSUMING NATIONS

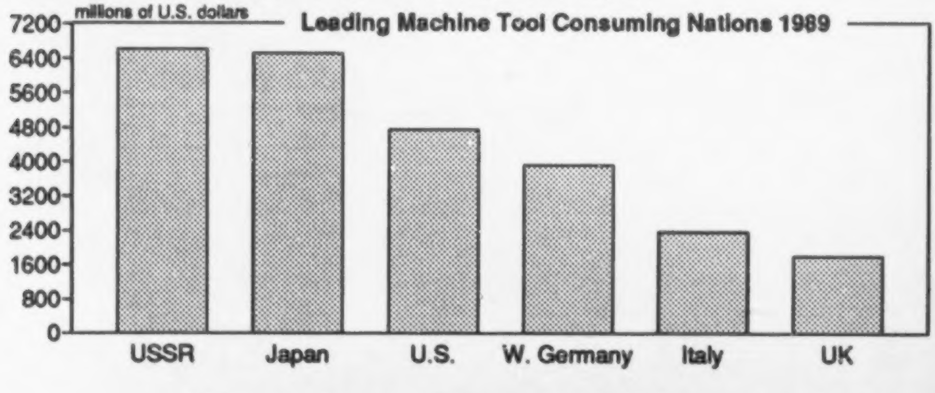
1985–1989

(millions of U.S. dollars)

	1985	1986	1987	1988	1989
1. Soviet Union$_E$	$4,213.0	$4,897.4	$5,303.2	$5,806.0	$6,620.0
2. Japan	3,356.6	4,081.5	3,649.1	5,845.5	6,532.6
3. United States	4,003.9	4,418.4	3,967.2	3,809.4	4,770.0
4. West Germany	1,947.9	3,325.8	4,001.4	3,769.4	3,927.4
5. Italy	604.5	1,001.7	1,753.0	2,036.0	2,375.2
6. United Kingdom	481.9	721.4	1,087.1	1,546.3	1,807.4
7. France	593.6	898.0	1,220.2	1,451.2	1,708.3
8. South Korea	385.6	664.6	979.5	1,184.7	1,444.6
9. China	549.5	478.7	1,033.5	1,190.3	1,163.6
10. Canada	428.0	421.6	708.4	978.6	866.5
11. Spain	160.3	323.4	606.9	753.6	819.5
12. Taiwan	152.1	185.0	412.7	616.5	722.8
13. Switzerland	155.8	276.3	576.7	621.9	648.1
14. Romania$_E$	344.0	325.8	619.4	619.2	636.6
15. Sweden	179.0	301.4	377.3	485.7	488.7
16. East Germany$_E$	67.8	177.5	308.5	443.6	475.0
17. Brazil	276.3	379.0	601.5	547.0	469.0
18. Austria	102.2	146.7	159.0	402.8	468.8
19. Poland$_E$	163.4	168.4	428.5	434.4	450.0
20. Czechoslovakia$_E$	152.4	153.4	160.0	373.2	400.9
21. India	305.4	286.9	389.6	400.1	372.8
22. Yugoslavia$_E$	165.4	314.3	356.6	301.3	350.8
23. Belgium	126.8	169.1	206.1	273.7	234.2
24. Mexico	161.0	216.0	267.4	186.0	213.9
25. Netherlands	104.4	175.1	229.0	166.8	161.3
26. Bulgaria$_E$	197.6	213.4	391.0	161.6	129.7
27. Finland$_E$	67.3	99.5	120.9	114.1	111.0
28. Denmark	86.2	134.1	133.8	122.6	110.1
29. Australia	137.9	169.0	177.3	75.6	91.7
30. Hungary$_E$	128.4	136.3	164.0	101.5	88.2
31. South Africa	393.3	59.9	73.7	88.7	76.1
32. Argentina	na	na	57.1	60.6	41.0
33. Portugal	27.4	32.9	42.3	43.6	42.5
34. Singapore	93.7	94.6	95.0	43.1	52.8
35. Hong Kong	47.2	69.4	70.4	23.6	20.5

Source: American Machinist, NMTBA

Note: Machine tool consumption is domestic production plus imports minus exports.



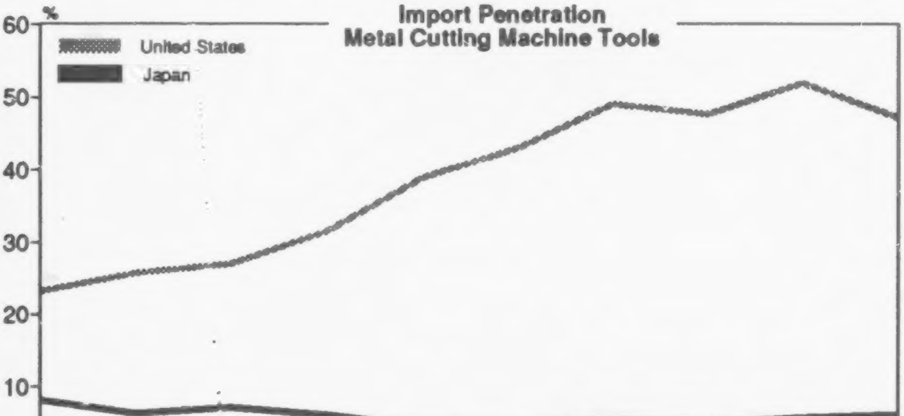
THE JAPANESE MACHINE TOOL INDUSTRY 1970 TO 1989

Metal Cutting Machine Tools

(millions of U.S. dollars)

	Production	Imports	Exports	Consumption	% Import Penetration	Exports as % of Prod.
1970	$867.6	$122.7	$66.9	$923.4	13.3%	7.7%
1971	755.4	113.6	80.1	788.9	14.4	10.6
1972	679.4	74.1	90.8	662.7	11.1	13.0
1973	1,120.1	78.3	129.3	1,069.1	7.3	11.5
1974	1,230.2	127.6	197.8	1,160.0	11.0	16.1
1975	777.4	72.7	207.6	642.5	11.3	26.7
1976	770.9	46.8	256.5	561.2	8.3	33.3
1977	1,165.1	58.5	430.1	793.5	7.4	36.9
1978	1,736.7	93.3	770.4	1,059.6	8.8	44.4
1979	2,208.9	119.6	942.8	1,385.7	8.6	42.7
1980	3,008.2	168.6	1,188.9	1,987.9	8.5	39.5
1981	3,860.3	175.1	1,409.2	2,626.2	6.7	36.5
1982	3,143.0	175.0	994.1	2,323.9	7.5	31.6
1983	2,956.7	136.9	999.7	2,093.9	6.5	33.8
1984	3,711.2	123.2	1,319.9	2,514.5	4.9	35.6
1985	4,406.5	147.5	1,656.1	2,897.9	5.1	37.6
1986	5,337.1	197.3	2,157.6	3,376.8	5.8	40.4
1987	4,762.0	152.6	2,049.0	2,865.6	5.3	43.0
1988	6,875.3	286.6	2,508.7	4,653.2	6.2	36.5
1989	8,257.5	366.0	3,106.6	5,516.9	6.6	37.6

Source: Japan Ministry of International Trade and Industry and Ministry of Finance.



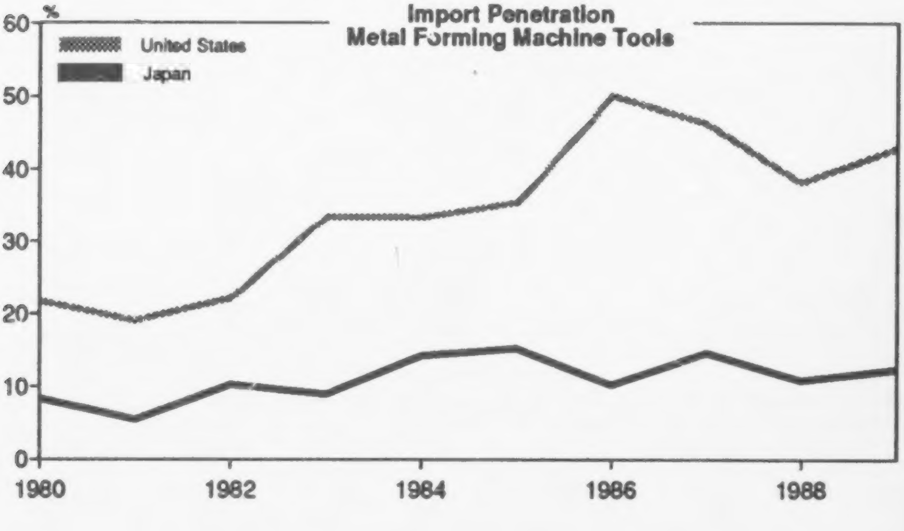
THE JAPANESE MACHINE TOOL INDUSTRY 1970 TO 1989

Metal Forming Machine Tools

(millions of U.S. dollars)

	Production	Imports	Exports	Consumption	% Import Penetration	Exports as % of Prod.
1970	$241.5	$37.5	$24.3	$254.7	14.7%	10.1%
1971	202.0	40.6	34.3	208.3	19.5	17.0
1972	216.3	29.2	54.9	190.6	15.3	25.4
1973	360.1	31.6	86.4	305.3	10.4	24.0
1974	420.0	48.6	109.8	358.8	13.5	26.1
1975	284.8	51.3	105.6	230.5	22.3	37.1
1976	294.6	24.1	113.4	205.3	11.7	38.5
1977	438.0	27.5	186.0	279.5	9.8	42.5
1978	613.7	26.8	241.1	399.4	6.7	39.3
1979	687.1	45.0	286.6	445.5	10.1	41.7
1980	818.0	52.5	264.0	606.5	8.7	32.3
1981	936.8	40.4	276.3	700.9	5.8	29.5
1982	653.3	45.3	269.3	429.3	10.6	41.2
1983	588.2	34.1	254.3	368.0	9.3	43.2
1984	761.7	58.4	419.3	400.8	14.6	55.0
1985	910.2	71.5	522.9	458.8	15.6	57.4
1986	1,535.5	75.0	905.8	704.7	10.6	59.0
1987	1,620.6	111.7	985.8	746.5	15.0	60.8
1988	1,793.6	110.5	919.3	984.8	11.2	51.3
1989	1,800.6	142.5	822.2	1,120.9	12.7	45.7

Source: Japan Ministry of International Trade and Industry and Ministry of Finance.



JAPANESE PRODUCTION, EXPORTS AND IMPORTS BY TYPE OF MACHINE

Metal Cutting Machine Tools, 1989

(millions of U.S. dollars)

	Production		Exports		Imports	
	Units	Value	Units	Value	Units	Value
TOTAL CUTTING	177,972	$8,257.5	360,057	$3,106.6	110,364	$366.0
TOTAL NC	58,042	6,029.1	348,250	2,524.3	882	139.6
Lathes	32,748	2,039.1	13,148	940.8	3,113	33.5
Numerically Controlled	24,491	1,824.2	9,266	870.3	74	6.9
Horizontal	23,661	1,703.3	9,008	834.9	58	4.8
Vertical	830	120.9	258	35.4	16	2.1
Center Lathes	3,644	97.1	1,358	14.0	2,203	17.1
Automatic	2,522	90.4	1,445	43.4	181	6.5
Other Lathes	2,091	27.4	1,079	13.2	655	3.0
Drilling Machines	37,705	210.3	7,030	126.3	32,865	9.1
Numerically Controlled	3,045	146.3	1,566	94.1	87	2.6
Radial	205	7.0	110	1.8	–	–
Multi-Spindle	441	15.6	307	15.6	–	–
Bench-Type	31,344	24.7	–	–	–	–
Other Drilling Machines	2,670	16.6	5,047	14.7	32,778	6.4
Boring Machines	1,447	193.6	529	74.1	141	8.0
Numerically Controlled	445	137.3	180	51.6	34	3.5
Horizontal	68	19.9	–	–	–	–
Jig Boring Machines	599	24.8	–	–	–	–
Other Boring Machines	335	11.6	349	22.4	107	4.5
Milling Machines	8,612	477.5	1,719	99.1	1,552	9.8
Numerically Controlled	2,933	304.4	279	67.7	56	3.1
Bed-Type	1,485	58.0	–	–	–	–
Knee-Type	3,384	87.5	336	6.2	517	3.8
Profile	445	16.4	115	1.4	–	–
Other Milling Machines	365	11.2	989	23.8	979	2.9
Grinding Machines	12,321	1,035.6	13,857	398.7	62,288	98.6
Numerically Controlled	1,929	353.5	890	188.7	178	45.4
External Cylindrical	1,731	147.6	187	15.4	93	8.1
Internal Cylindrical	460	49.7	115	15.0	31	2.9
Surface Grinders	3,925	185.7	670	23.4	911	14.6
Centerless	954	118.6	212	30.1	–	–
Honing or Lapping	419	27.0	410	26.2	115	3.8
Tool or Cutter Machines	1,661	34.1	4,864	15.3	20,607	7.7
Other Grinding Machines	1,661	119.4	6,509	84.6	40,353	16.0
Gear Cutting or Finishing	1,080	157.1	474	33.9	199	41.6
Numerically Controlled	na	na	130	23.7	47	26.1
Gear Hobbing	493	67.7	211	5.3	58	2.4
Other Gear Cutting	180	32.9	75	1.8	38	5.0
Gear Finishing	407	56.5	58	3.1	56	8.1
Special Purpose Machines	5,138	954.9	193	135.4	17	3.9
Numerically Controlled	1,640	335.0	133	96.5	–	–
Other Special Purpose	3,498	619.9	60	38.9	–	–
Machining Centers	14,828	2,074.5	5,253	812.3	103	10.4
Horizontal Spindle	3,416	801.8	1,434	345.6	34	2.8
Vertical Spindle	9,861	940.7	3,416	392.7	69	7.6
Double Column Type	1,551	332.0	–	–	–	–
Turning Centers	–	–	403	74.0	–	–
Electro-Discharge Machines	6,923	634.1	2,923	237.4	457	22.3
Numerically Controlled	6,515	604.7	2,718	232.6	131	15.6
Other EDM	408	29.4	205	4.8	326	6.7
Other Cutting Machines	57,170	480.7	314,931	248.6	9,629	128.8
Numerically Controlled	2,216	249.0	1,430	86.6	172	25.8
Planing, Shaping, etc.	291	22.7	315	6.5	38	0.2
Sawing or Cut-off	7,113	74.6	297,641	100.9	7,291	13.5
Threading & Tapping	46,000	65.7	10,023	17.5	145	1.3
Other N.E.C.	1,131	68.7	5,522	37.0	1,983	88.0

Sources: Japanese Ministry of International Trade and Industry, Ministry of Finance. Individual items may not add to totals due to rounding.

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E – estimated from fragmented data, N.E.C. – not elsewhere classified

JAPANESE PRODUCTION, EXPORTS AND IMPORTS BY TYPE OF MACHINE

Metal Cutting Machine Tools, 1988

(millions of U.S. dollars)

	Production		Exports		Imports	
	Units	Value	Units	Value	Units	Value
TOTAL CUTTING	169,326	$6,875.3	371,411	$2,508.7	92,592	$283.1
TOTAL NC	47,650	4,842.9	19,239	1,998.7	855	112.6
Lathes	28,257	1,771.6	11,889	781.7	1,873	26.9
Numerically Controlled	20,942	1,585.6	8,186	730.3	141	12.0
Horizontal	20,209	1,492.4	7,891	683.6	107	6.3
Vertical	733	93.3	295	46.7	34	5.7
Center Lathes	3,110	83.4	1,475	11.0	1,258	9.2
Automatic	2,536	82.0	1,014	27.8	174	4.2
Other Lathes	1,669	20.7	1,214	12.6	300	1.5
Drilling Machines	31,731	175.1	7,334	94.2	24,543	5.1
Numerically Controlled	2,438	120.7	1,189	65.2	10	1.7
Radial	241	7.1	121	2.1	–	–
Multi–Spindle	370	13.9	801	19.1	–	–
Bench–Type	26,546	19.4	–	–	–	–
Other Drilling Machines	2,136	14.0	5,223	7.9	24,533	3.5
Boring Machines	1,223	151.8	515	69.8	77	9.9
Numerically Controlled	195	75.3	125	45.0	23	5.8
Horizontal	188	44.3	–	–	–	–
Jig Boring Machines	548	24.5	–	–	–	–
Other Boring Machines	292	7.8	390	24.7	54	4.1
Milling Machines	6,959	379.2	2,306	91.6	1,308	6.3
Numerically Controlled	2,319	235.5	328	59.7	76	1.9
Bed–Type	1,109	46.9	–	–	–	–
Knee–Type	2,792	74.4	380	9.1	387	1.9
Profile	402	11.5	50	1.9	–	–
Other Milling Machines	337	10.9	1,548	20.9	845	2.5
Grinding Machines	11,667	853.0	13,017	310.3	60,125	80.1
Numerically Controlled	1,447	221.9	805	124.3	156	33.2
External Cylindrical	1,540	131.5	207	23.4	66	7.7
Internal Cylindrical	503	62.0	101	11.1	19	1.4
Surface Grinders	4,336	203.4	711	21.5	830	10.6
Centerless	796	87.8	182	20.2	–	–
Honing or Lapping	381	27.9	298	13.6	514	4.5
Tool or Cutter Machines	1,316	26.2	4,099	12.1	17,421	5.7
Other Grinding Machines	1,348	92.3	6,614	84.1	41,119	17.0
Gear Cutting or Finishing	1,001	129.7	474	36.8	201	33.4
Numerically Controlled	na	na	161	26.4	45	20.7
Gear Hobbing	542	58.7	182	5.4	107	3.3
Other Gear Cutting	141	25.3	79	3.3	19	3.6
Gear Finishing	318	45.6	52	1.7	30	5.8
Special Purpose Machines	5,074	808.2	99	59.9	12	4.3
Numerically Controlled	1,640	283.7	28	33.6	–	–
Other Special Purpose	3,434	524.5	71	26.4	–	–
Machining Centers	11,474	1,613.8	4,351	647.2	80	5.2
Horizontal Spindle	2,692	609.2	1,258	294.9	19	1.3
Vertical Spindle	7,712	770.5	2,742	290.0	61	3.9
Double Column Type	1,060	227.2	–	–	–	–
Turning Centers	10	6.8	351	62.3	–	–
Electro–Discharge Machines	6,140	589.4	2,743	231.9	503	18.2
Numerically Controlled	5,819	561.4	2,524	221.7	169	14.8
Other EDM	321	28.0	219	10.2	334	3.4
Other Cutting Machines	65,800	403.5	328,683	185.3	3,870	101.9
Numerically Controlled	1,376	145.1	1,402	18.6	155	17.3
Planing, Shaping, etc.	227	17.4	1,456	6.5	20	0.7
Sawing or Cut–off	6,116	64.8	313,263	89.1	2,432	7.3
Threading & Tapping	56,564	69.4	8,118	14.3	66	0.5
Other N.E.C.	1,517	106.9	4,292	56.8	1,197	71.6

Sources: Japanese Ministry of International Trade and Industry, Ministry of Finance. Individual items may not add to totals due to rounding.

JAPANESE MACHINE TOOL PRODUCTION 1987–1989

Metal Cutting Machine Tools

(millions of U.S. dollars)

	1987		1988		1989	
	Units	Value	Units	Value	Units	Value
Machine Tool Total	125,536	$4,762.0	169,326	$6,875.3	177,972	$8,257.5
Numerically Controlled	35,460	3,364.7	47,650	4,842.9	58,042	6,029.1
Lathes	21,066	1,230.9	28,257	1,771.6	32,748	2,039.1
Numerically Controlled	15,241	1,079.3	20,942	1,585.6	24,491	1,824.2
Horizontal	618	76.1	733	93.3	23,661	1,703.3
Vertical	14,623	1,003.2	20,209	1,492.4	830	120.9
Center Lathes	2,224	52.8	3,110	73.8	3,644	97.1
Automatic	2,515	82.3	2,536	82.0	2,522	90.4
Other Lathes	1,086	16.5	1,669	20.7	2,091	27.4
Drilling Machines	23,206	101.3	31,731	175.1	37,705	210.3
Numerically Controlled	1,597	63.2	2,438	120.7	3,045	146.3
Radial	225	5.2	241	7.1	20[illegible]	7.0
Multi–Spindle	359	11.6	370	13.9	4[illegible]	15.6
Bench–Type	19,125	10.9	26,546	19.4	31,3[illegible]	24.7
Other Drilling Machines	1,900	10.3	2,136	14.0	2,6[illegible]	16.6
Boring Machines	871	95.8	1,223	151.8	1,4[illegible]	193.6
Numerically Controlled	168	53.7	195	75.2	[illegible]	137.3
Horizontal	97	20.3	188	44.2	[illegible]8	19.9
Jig Boring Machines	374	16.2	548	24.5	599	24.8
Other Boring Machines	232	5.5	292	8.0	335	11.6
Milling Machines	4,859	258.1	6,959	379.2	8,612	477.5
Numerically Controlled	1,811	172.5	2,319	235.5	2,933	304.4
Bed–Type	596	22.6	1,109	46.9	1,485	56.0
Knee–Type	1,813	43.3	2,792	74.4	3,384	87.5
Profile	425	11.8	402	11.5	445	16.4
Other Milling Machines	214	7.9	337	10.9	365	11.2
Grinding Machines	8,291	543.1	11,286	825.1	12,321	1,008.7
Numerically Controlled	939	131.6	1,447	221.9	1,929	353.5
External Cylindrical	1,089	89.1	1,540	131.5	1,731	147.6
Internal Cylindrical	419	38.1	503	62.0	460	49.7
Surface Grinders	3,487	127.3	4,336	203.4	3,925	185.7
Centerless	606	52.5	796	87.8	954	118.6
Tool or Cutter Machines	973	32.0	1,316	26.2	1,661	34.1
Other Grinding Machines	778	72.5	1,348	92.3	1,661	119.4
Gear Cutting or Finishing	746	88.5	1,001	129.7	1,080	157.1
Gear Hobbing	349	38.4	542	58.7	493	67.7
Other Gear Cutting	119	18.5	141	25.3	180	32.9
Gear Finishing	278	31.6	318	45.6	407	56.5
Special Purpose Machines	3,476	570.6	5,074	808.2	5,138	954.9
Numerically Controlled	1,140	198.8	1,640	283.7	1,640	335.0
Other Special Purpose	2,336	371.7	3,434	524.5	3,498	619.9
Machining Centers	9,027	1,160.3	11,474	1,613.8	14,828	2,074.5
Vertical	5,869	547.8	7,712	770.5	3,416	801.8
Y–axis < 500mm	4,031	298.7	5,628	470.9	9,861	940.7
Y–axis > 500mm	1,838	249.1	2,084	299.6	1,551	332.0
Horizontal	2,345	462.2	2,692	609.2	3,416	801.8
Table Size < 500mm	894	115.2	959	147.4	na	na
Table Size > 500mm	1,451	347.0	1,733	461.8	na	na
Double Column Type	812	150.0	1,060	227.2	1,551	332.0
Turning Centers	1	0.3	10	6.8	–	–
Electro–Discharge Machines	5,064	453.2	6,140	589.4	6,923	634.1
Numerically Controlled	4,744	433.7	5,819	561.4	6,515	604.7
Die Sinking	1,597	149.2	1,724	163.0	na	na
Wire Type	3,147	284.5	4,095	398.4	na	na
Other EDM	320	19.5	321	28.0	408	29.4
Other Metal Cutting Machines	48,930	260.4	66,181	431.4	57,170	507.7
Numerically Controlled	793	71.4	1,376	145.1	2,216	249.0
Planing, Shaping, etc.	250	14.2	227	17.4	291	22.7
Honing or Lapping Machines	340	16.7	381	27.9	419	27.0
Sawing or Cut–off	5,362	39.5	6,116	64.8	7,113	74.6
Threading & Tapping	41,062	42.1	56,564	69.4	46,000	65.7
Other n.e.c.	1,123	76.5	1,517	106.9	1,131	68.7

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E – estimated from fragmented data, N.E.C. – not elsewhere classified

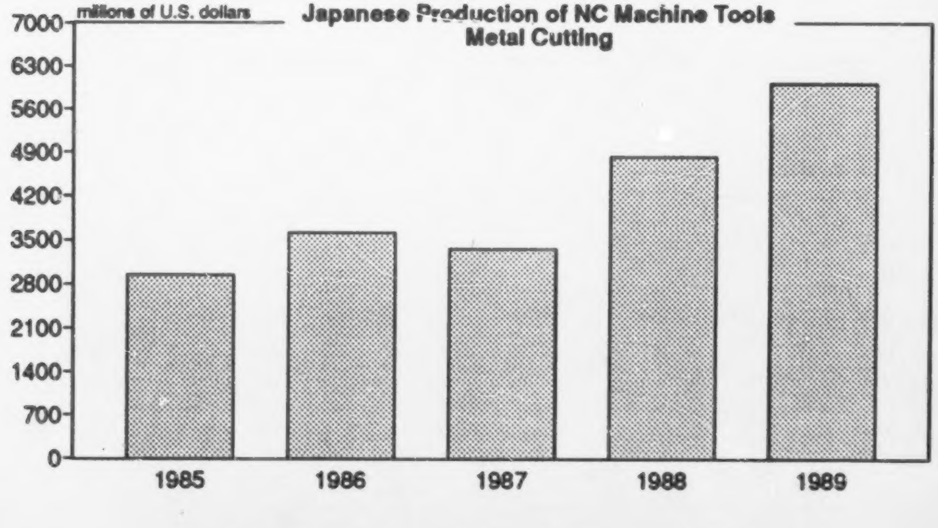
JAPANESE PRODUCTION OF NC MACHINE TOOLS

Metal Cutting Machine Tools

(millions of U.S. dollars)

	1985	1986	1987	1988	1989
GRAND TOTAL					
Units	44,969	38,776	35,460	47,650	58,042
Value	$2,950.4	$3,623.0	$3,364.7	$4,842.9	$6,029.1
Boring Machines					
Units	168	208	168	195	445
Value	38.4	65.5	53.7	72.3	137.3
Drilling Machines					
Units	633	1,339	1,597	2,438	3,045
Value	19.1	42.2	63.2	120.7	146.3
Milling Machines					
Units	2,664	1,977	1,811	2,319	2,933
Value	160.8	166.6	172.5	235.5	304.4
Grinding Machines					
Units	1,051	1,059	939	1,447	1,929
Value	78.1	131.5	131.6	221.9	353.5
Lathes					
Units	19,084	15,976	15,241	20,942	24,491
Value	926.4	1,080.4	1,079.3	1,585.6	1,824.2
Special Machines					
Units	1,531	1,441	1,140	1,640	1,640
Value	190.4	235.8	198.8	283.7	335.0
Electro–Discharge Machines					
Units	5,830	5,240	4,744	5,819	6,515
Value	375.8	492.5	433.7	561.4	604.7
Machining Centers					
Units	13,345	10,857	9,027	11,474	14,828
Value	1,120.6	1,353.4	1,160.3	1,613.8	2,074.5
Other NC Machines					
Units	663	679	793	1,376	2,216
Value	40.8	55.2	71.4	148.1	249.0

Individual items may not add to totals due to rounding. Source: Japan Ministry of International Trade and Industry.



JAPANESE MACHINE TOOL TRADE WITH THE UNITED STATES
Numerically Controlled Metal Cutting Machine Tools, 1988
(millions of U.S. dollars)

	Exports to U.S.		Imports from U.S.	
Type of Machine	Units	Value	Units	Value
Boring Machines	32	$11.7	1	$1.1
Drilling Machines	430	20.9	0	0.0
Grinding Machines	277	27.4	37	9.2
Lathes	3,590	299.5	2	0.2
Milling	65	15.4	2	0.1
Machining Centers	2,013	249.4	5	0.6
Other	2,107	105.6	163	20.9
TOTAL	8,514	729.9	210	32.1

Source: Japan Ministry of Finance.

JAPANESE MACHINE TOOL TRADE WITH THE UNITED STATES
Numerically Controlled Metal Cutting Machine Tools, 1989
(millions of U.S. dollars)

	Exports to U.S.		Imports from U.S.	
Type of Machine	Units	Value	Units	Value
Laser Process Machines	96	$23.7	115	$22.7
Electro–Discharge Machines	926	76.3	41	5.6
Machining Centers	2,350	76.3	3	4.7
Special Purpose Machines	61	32.9	na	na
Lathes	3,745	353.7	13	0.3
Drilling Machines	525	34.2	2	0.3
Boring–Milling Machines	14	3.8	0	0.0
Boring Machines	23	3.6	0	0.0
Milling Machines	62	19.1	1	(a)
Threading & Tapping	154	9.3	na	na
Grinding Machines	310	70.5	40	10.4
Others	748	9.7	7	5.1
TOTAL	9,014	957.8	222	49.0

(a) – less than $50,000. Source: Japan Ministry of Finance

JAPANESE IMPORTS OF MACHINE TOOLS 1986–1989
by Country
(millions of U.S. dollars)

	UNITS				VALUES			
Country of Origin	1986	1987	1988	1989	1986	1987	1988	1989
TOTAL CUTTING	15,851	42,429	92,592	110,364	$197.3	$152.6	$286.6	$366.0
United States	1,240	1,022	2,238	3,337	31.6	29.3	106.2	141.2
Western Europe								
Austria	197	145	280	243	0.4	4.0	0.7	0.6
France	361	480	356	515	1.4	0.7	3.2	2.4
Italy	377	383	1,147	1,138	3.6	3.2	4.2	3.7
Sweden	79	39	70	91	0.8	0.1	1.4	2.2
Switzerland	665	437	712	751	51.7	36.3	58.3	64.4
United Kingdom	344	2,373	225	310	3.8	2.9	4.9	5.0
West Germany	902	737	1,515	1,126	68.6	42.7	56.3	65.9
Eastern Europe								
Czechoslovakia	10	12	7	7	0.4	0.8	1.0	0.3
East Germany	30	42	22	30	3.6	2.9	4.2	5.3
Poland	2	3	2	10	(a)	0.4	0.3	1.0
Soviet Union	263	220	120	68	4.9	4.4	5.2	2.6
Asia								
Singapore	620	793	863	874	6.2	7.5	9.3	11.8
Taiwan	9,664	34,553	78,460	96,725	9.0	10.3	18.1	35.6
South Korea	606	456	907	1,090	3.9	3.4	7.7	12.0
Other Countries	491	1,190	6,575	4,051	7.8	7.1	13.7	12.0
TOTAL FORMING	2,992	5,135	4,214	5,111	75.0	111.7	110.5	142.5
United States	1,525	1,155	1,470	1,251	25.0	32.8	47.7	43.7
Western Europe								
Switzerland	251	257	321	377	11.7	11.4	20.5	18.9
West Germany	185	241	316	679	24.8	33.2	20.5	43.5
Other Countries	1,031	3,482	2,107	2,804	13.6	34.4	21.8	36.4

(a) – less than $50,000 Source: Japan Ministry of Finance. Individual items may not add to totals due to rounding.

JAPANESE IMPORTS OF MACHINE TOOLS 1986–1989
Metal Cutting Machine Tools
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL	$147.5	$197.3	$152.6	$286.6	$366.0
Lathes	16.4	30.4	17.1	26.9	33.5
of which NC	1.8	16.3	6.5	12.0	6.9
Drilling Machines	2.0	2.9	6.4	5.1	9.1
of which NC	0.3	0.8	2.8	1.7	2.6
Boring Machines	3.0	5.9	3.0	9.9	8.0
of which NC	1.1	3.7	1.1	5.8	3.5
Milling Machines	10.8	11.2	14.6	6.3	9.8
of which NC	3.3	4.0	10.1	4.4	3.1
Grinding Machines	73.0	89.4	71.3	80.1	98.6
of which NC	21.9	37.8	29.5	33.2	45.4
Gear Cutting Machines	14.1	28.4	16.5	33.4	41.6
of which NC	2.6	6.4	6.4	20.7	26.1
Machining Centers	(a)	(a)	(a)	5.2	10.4
Physico-Chemical	(a)	(a)	(a)	96.5	124.2
Other Metal Cutting	48.0	83.3	70.7	112.6	30.8
of which NC	28.3	29.2	23.6	23.2	na

(a) – included in "Other Metal Cutting" Source: Japan Machine Tool Builders' Association

JAPANESE IMPORTS OF METAL CUTTING MACHINE TOOLS

Selected Countries, 1989

(millions of U.S. dollars)

	Korea	Taiwan	Singapore	U.K.	W.Germ.	Switz.	E.Germ.	U.S.
TOTAL METAL CUTTING								
Units	1,090	96,725	874	310	1,126	751	30	3,337
Value	$12.0	$35.6	$11.8	$5.0	$65.9	$64.4	$5.3	$141.2
of which NC								
Units	51	207	2	30	120	162	12	222
Value	2.8	5.0	0.2	2.1	31.5	40.9	1.8	49.0
Physico-Chemical Machines								
Units	2	191	8	36	87	116	0	929
Value	(a)	3.5	0.5	1.8	3.0	9.1	0.0	104.8
of which EDM								
Units	0	179	6	22	60	111	0	67
Value	0.0	3.5	0.3	1.2	1.5	9.1	0.0	6.7
Machining Centers								
Units	33	60	0	4	10	0	1	103
Value	2.0	2.7	0.0	0.6	0.1	0.0	(a)	4.7
Special Purpose Machines								
Units	0	0	0	0	1	10	0	1
Value	0.0	0.0	0.0	0.0	0.4	1.8	0.0	0.3
Lathes								
Units	236	1,709	0	72	126	58	0	206
Value	2.4	11.8	0.0	0.4	9.5	1.8	0.0	1.4
Drilling Machines								
Units	31	32,129	1	0	37	7	0	304
Value	1.0	5.2	(a)	0.0	1.1	0.5	0.0	0.5
Boring-Milling Machines								
Units	0	59	0	0	37	5	3	3
Value	0.0	1.4	0.0	0.0	1.8	1.8	0.6	(a)
Boring Machines								
Units	0	0	1	0	3	5	0	2
Value	0.0	0.0	(a)	0.0	0.5	0.9	0.0	(a)
Milling Machines								
Units	235	927	20	2	43	17	5	28
Value	2.2	3.3	0.1	0.2	1.3	0.4	1.0	0.2
Threading & Tapping								
Units	2	23	7	0	9	1	0	91
Value	(a)	(a)	0.1	0.0	0.2	0.3	0.0	0.3
Grinding Machines								
Units	203	55,845	836	180	358	272	16	1,348
Value	3.6	4.8	11.0	2.0	27.4	24.3	1.6	16.4
Other Metal Cutting								
Units	348	5,782	1	16	424	260	6	422
Value	0.7	2.9	(a)	0.1	20.6	23.5	2.1	12.6

(a) – less than $50,000 Source: Japan Ministry of Finance

JAPANESE EXPORTS OF METAL CUTTING MACHINE TOOLS

Selected Countries, 1989

(millions of U.S. dollars)

	S. Korea	Taiwan	Thai.	Sing.	Indonesia	Sweden	U.K.	Belgium
TOTAL METAL CUTTING								
Units	5,213	17,930	11,342	11,504	2,951	1,681	12,230	2,307
Value	$307.0	$166.4	$141.4	$66.6	$38.5	$49.0	$145.5	$161.4
of which NC								
Units	925	923	585	471	105	345	1,138	853
Value	220.7	122.1	64.4	41.3	15.3	47.6	122.4	160.9
Physico–Chemical Machines								
Units	866	520	59	208	5	131	129	53
Value	30.8	23.3	4.1	9.8	0.1	3.4	8.4	10.7
of which EDM								
Units	213	210	44	106	1	20	116	2
Value	22.6	18.7	4.0	8.9	(a)	1.6	7.8	0.1
Machining Centers								
Units	52	217	73	46	24	105	248	358
Value	19.0	42.8	8.6	5.8	5.6	20.8	44.8	81.1
Special Purpose Machines								
Units	76	6	12	9	1	0	11	0
Value	70.5	1.9	1.8	4.3	0.1	0.0	2.6	0.0
Lathes								
Units	304	[illegible]	1,711	378	112	179	700	433
Value	24.8	[illegible]	36.5	18.3	7.7	18.2	56.9	67.0
Drilling Machines								
Units	424	319	539	853	132	120	319	50
Value	8.9	7.5	8.1	6.0	7.5	1.9	6.1	0.3
Boring–Milling Machines								
Units	60	27	29	19	1	2	2	0
Value	11.6	3.6	4.4	1.6	(a)	1.0	0.4	0.0
Boring Machines								
Units	42	33	76	2	30	0	10	0
Value	7.9	3.6	3.9	(a)	4.1	0.0	2.9	0.0
Milling Machines								
Units	115	157	313	118	65	13	8	0
Value	17.8	11.5	10.5	2.8	4.3	0.5	0.8	0.0
Threading & Tapping								
Units	189	2,791	677	336	120	264	822	28
Value	0.8	3.3	3.0	1.4	0.7	0.4	1.3	0.2
Grinding Machines								
Units	840	512	1,348	900	402	33	1,676	27
Value	77.3	37.0	52.5	12.3	5.8	2.2	15.3	1.9
Other Metal Cutting								
Units	2,245	12,910	6,505	8,635	2,059	834	8,305	1,358
Value	37.5	14.3	8.0	4.2	2.6	0.6	6.0	0.2

JAPANESE EXPORTS OF METAL CUTTING MACHINE TOOLS

Selected Countries, 1989

(millions of U.S. dollars)

	France	W. Germ.	Switz.	Italy	China	Canada	U.S.	Australia
TOTAL METAL CUTTING								
Units	6,128	6,930	874	3,407	2,322	26,849	170,212	34,796
Value	$52.5	$309.1	$57.8	$61.6	$35.3	$47.2	$1,130.2	$46.1
of which NC								
Units	503	3,284	609	601	48	333	9,014	346
Value	49.2	299.0	57.0	58.9	19.7	41.6	957.8	38.0
Physico–Chemical Machines								
Units	53	1,076	2	82	26	8	2,968	34
Value	2.1	71.0	0.3	3.9	3.1	0.9	111.6	1.8
of which EDM								
Units	32	918	2	46	14	8	966	18
Value	2.1	70.1	0.3	2.6	1.9	0.9	77.9	1.5
Machining Centers								
Units	169	676	108	142	9	147	2,350	92
Value	21.7	97.5	14.6	21.4	3.1	19.0	321.0	12.8
Special Purpose Machines								
Units	0	2	0	0	0	0	72	0
Value	0.0	0.2	0.0	0.0	0.0	0.0	15.2	0.0
Lathes								
Units	204	1,476	487	340	58	191	4,015	234
Value	17.0	107.2	41.0	29.1	3.0	12.9	371.4	21.3
Drilling Machines								
Units	77	939	22	336	46	6	969	307
Value	2.7	17.8	1.1	2.3	1.4	0.3	43.4	0.7
Boring–Milling Machines								
Units	1	2	0	0	8	18	24	3
Value	0.2	0.5	0.0	0.0	1.7	6.5	4.2	0.1
Boring Machines								
Units	4	0	0	0	3	1	51	8
Value	1.5	0.0	0.0	0.0	0.8	0.2	5.1	0.4
Milling Machines								
Units	3	49	0	18	53	6	475	62
Value	0.2	1.9	0.0	0.6	10.4	1.3	24.5	0.6
Threading & Tapping								
Units	74	1,023	65	337	41	16	706	120
Value	1.6	5.8	0.1	0.6	0.4	0.1	11.8	0.2
Grinding Machines								
Units	183	498	166	65	302	73	3,499	312
Value	3.2	4.5	0.7	1.0	8.0	1.5	130.4	1.6
Other Metal Cutting								
Units	5,360	1,189	24	2,083	1,776	26,383	155,083	33,624
Value	2.2	2.7	(a)	2.7	3.5	4.5	55.6	6.5

(a) – less than $50,000 Source: Japan Ministry of Finance

JAPANESE PRODUCTION, EXPORTS & IMPORTS BY TYPE OF MACHINE, 1987 TO 1989

Metal Forming Machine Tools

(millions of U.S. dollars)

	Production			Exports			Imports		
Type of Machine	1987	1988	1989	1987	1988	1989	1987	1988	1989
Total									
Units	22,101	29,662	31,644	33,848	26,237	30,119	5,135	4,214	5,111
Value	$1,620.6	$1,793.6	$1,800.6	$985.8	$919.3	$822.2	$111.7	$110.5	$142.5
Hydraulic Presses									
Units	5,685	7,212	7,901	1,633	2,066	2,340	102	114	190
Value	187.5	264.4	300.2	78.1	78.7	82.6	6.1	3.5	10.5
Mechanical Presses									
Units	9,710	13,237	13,672	5,040	8,018	9,572	393	672	1,361
Value	1,166.3	1,132.0	1,052.1	578.0	421.3	327.0	21.5	25.6	15.1
Forging & Stamping									
Units	606	748	767	274	510	720	89	74	314
Value	56.1	77.8	75.4	34.5	55.2	54.4	28.8	16.3	29.3
Shearing Machines									
Units	4,344	5,829	6,611	8,556	6,200	9,220	303	433	1,086
Value	105.6	153.7	178.2	110.6	40.5	174.8	9.9	2.7	24.8
Bending Machines									
Units	866	959	1,014	2,030	2,491	2,821	335	738	1,137
Value	48.1	54.4	65.1	65.7	72.2	88.7	16.1	17.2	25.3
Wire Forming Machines									
Units	890	1,677	1,679	209	803	682	5	236	183
Value	57.1	111.2	129.7	9.2	27.9	28.2	0.7	8.3	6.0
Other Forming Machines									
Units	—	—	—	16.1	6.1	4,764	3.9	1.9	840
Value	—	—	—	109.7	223.5	66.6	28.8	36.9	31.6

Note: Individual items may not add to totals due to rounding. Source: Japan Forming Machinery Association.

JAPANESE EXPORTS OF MACHINE TOOLS

Metal Cutting and Metal Forming, 1986 to 1989

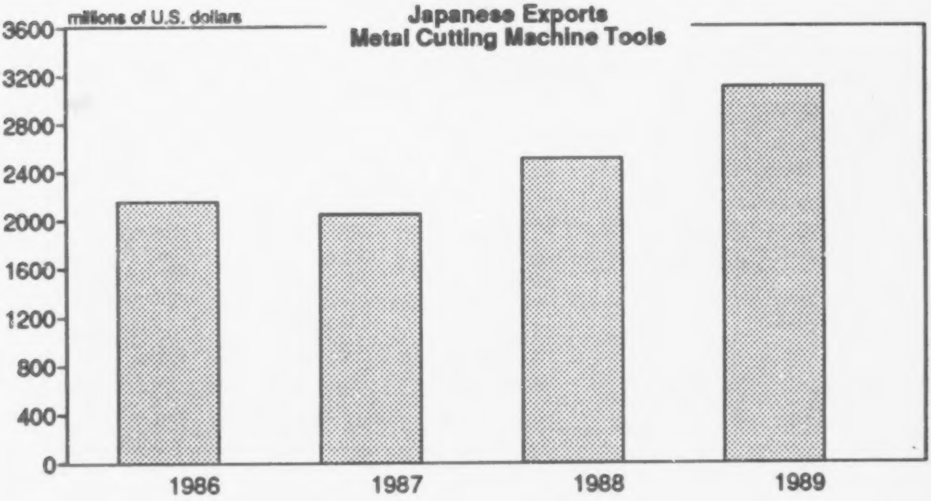
(millions of U.S. dollars)

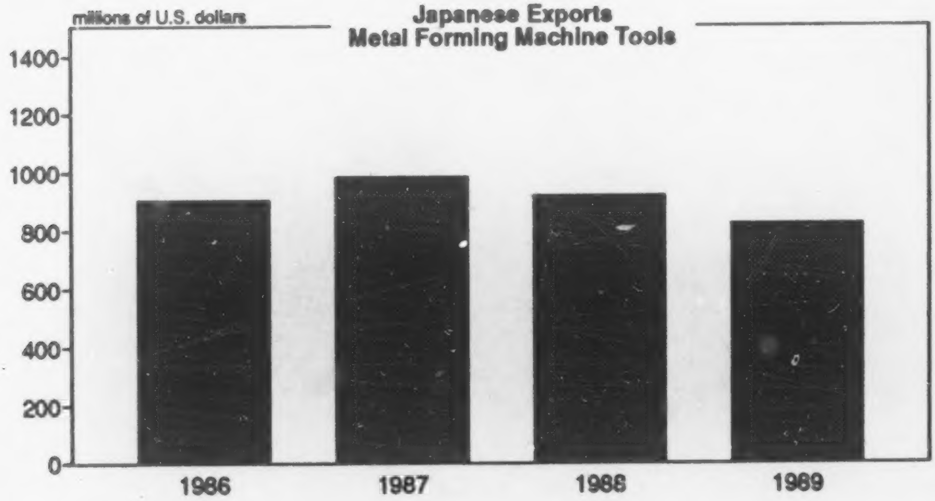
	UNITS				VALUES			
Destination	1986	1987	1988	1989	1986	1987	1988	1989
TOTAL CUTTING	433,243	373,969	371,411	360,057	$2,157.6	$2,049.0	$2,508.7	$3,106.6
North & South America								
Brazil	148	260	187	313	6.7	13.8	13.8	15.7
Canada	47,640	16,370	25,932	26,849	33.8	40.2	43.5	47.2
Mexico	185	86	152	223	5.9	4.4	17.2	22.2
United States	269,692	231,996	189,939	170,212	859.3	673.6	842.4	1,130.2
Western Europe								
Belgium	2,627	2,675	2,435	2,307	110.2	120.5	108.0	161.4
France	5,244	5,038	6,543	6,128	29.9	28.6	69.2	52.5
Netherlands	1,867	3,162	1,902	1,766	16.4	12.2	16.7	19.1
Norway	903	1,136	570	313	7.9	3.8	5.7	3.3
Sweden	1,198	1,246	1,055	1,681	35.5	33.6	42.1	49.0
United Kingdom	7,464	8,355	10,128	12,230	78.6	70.7	106.9	145.5
West Germany	4,896	5,526	6,738	6,930	184.3	193.0	254.1	309.1
Eastern Europe								
Poland	15	3	4	na	3.1	1.3	0.7	na
Soviet Union	303	190	234	228	39.6	29.9	52.5	12.0
Asia								
China	2,285	13,452	15,529	2,322	157.8	62.6	27.8	35.3
Korea	3,082	3,929	4,204	5,213	178.5	268.4	297.0	307.0
Philippines	1,833	770	1,476	1,841	3.5	4.1	4.5	11.8
Singapore	4,999	7,651	9,020	11,504	22.8	42.5	68.4	66.6
Taiwan	8,635	12,403	15,534	17,930	45.9	99.6	128.1	166.4
Thailand	2,023	3,668	6,430	11,342	11.1	30.4	63.7	141.4
All Other Countries								
Australia	21,048	20,903	28,500	34,796	63.5	33.8	46.0	46.1
South Africa	1,660	2,420	3,316	3,082	4.8	8.1	10.0	5.5
All Other Countries	45,411	32,661	41,455	42,847	257.4	272.8	311.2	359.3
TOTAL FORMING	27,790	33,848	26,237	30,119	$905.8	$985.8	$919.3	$822.2
North America								
Canada	265	481	631	284	82.8	28.5	61.2	22.4
Mexico	78	214	86	212	6.3	4.8	1.0	3.8
United States	10,345	9,523	7,368	8,750	451.4	422.2	303.9	253.9
Western Europe								
France	129	190	296	888	6.5	8.8	18.7	26.4
Italy	147	89	105	124	2.9	8.8	10.1	14.4
Switzerland	226	29	177	73	1.1	1.5	1.5	2.9
United Kingdom	711	918	716	726	10.2	43.4	27.2	37.8
West Germany	1,033	993	447	803	26.3	18.8	20.2	12.8
Eastern Europe								
Soviet Union	27	41	135	169	20.5	57.4	69.6	50.4
Asia								
China	1,547	923	1,001	980	104.0	83.8	52.3	37.6
Indonesia	1,150	554	298	281	6.8	11.5	7.4	11.2
South Korea	1,166	1,463	1,290	1,187	53.9	81.4	90.6	104.9
Malaysia	234	483	500	1,181	6.6	14.5	16.3	20.5
Singapore	722	1,049	1,253	1,359	14.0	30.0	27.7	26.3
Taiwan	1,479	2,353	2,071	1,915	27.5	55.8	80.5	52.8
All Other Countries	8,531	14,525	9,861	10,787	85.0	113.8	131.0	144.1

Sources: Japan Ministry of Finance and Ministry of International Trade and Industry. Individual items may not add to totals due to rounding.

JAPANESE EXPORTS OF MACHINE TOOLS

Metal Cutting and Metal Forming, 1986 to 1989





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E – estimated from fragmented data, N.E.C. – not elsewhere classified

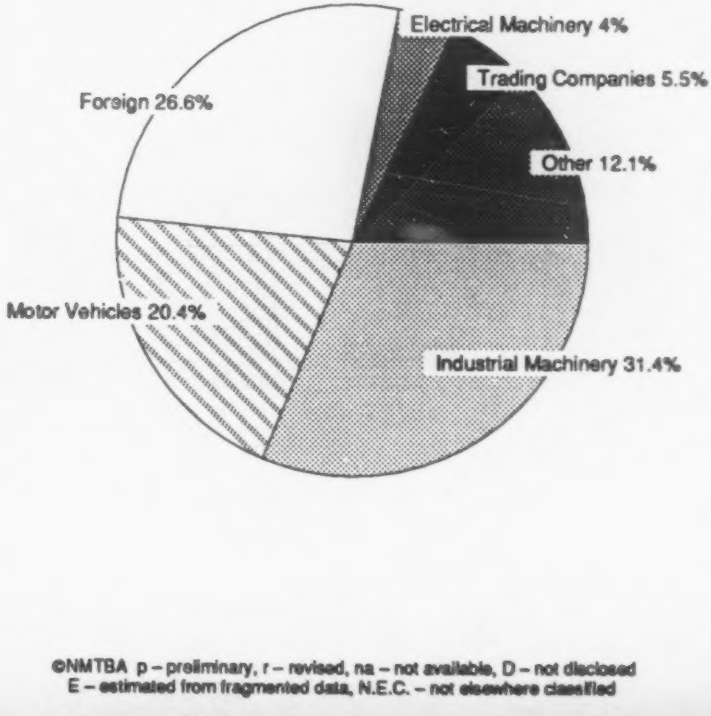
JAPANESE METAL CUTTING MACHINE TOOL ORDERS
By User Industry 1986–1989

(millions of U.S. dollars)

User Industry	1986	1987	1988	1989
Grand Total	$4,564.8	$4,809.8	$7,749.5	$9,203.3
of which NC	3,485.5	3,698.8	6,078.4	7,560.7
Primary Metals	24.8	49.8	59.3	81.4
Fabricated Metal Products	91.8	141.4	160.2	232.0
Industrial Machinery	1,169.7	1,232.5	2,375.6	2,889.5
Electrical Machinery	145.5	178.4	316.6	366.6
Motor Vehicles	775.2	888.4	1,391.9	1,873.7
Shipbuilding/Transp. Equip.	53.2	53.0	113.7	129.6
Precision Instruments	156.4	203.1	306.0	272.8
Other Machinery & Equip.	71.4	102.9	216.5	281.9
Govt., Publ. Agencies, Schools	14.8	22.9	39.1	26.5
Other Domestic End Users	32.5	20.5	56.3	93.6
Trading Companies	386.7	394.4	518.3	507.6
Foreign	1,642.8	1,522.7	2,196.0	2,448.0
Backlog	1,698.6	1,974.0	3,154.8	3,803.2
of which NC	1,375.8	1,328.3	2,183.2	2,859.2

Source: Japan Machine Tool Builders' Association

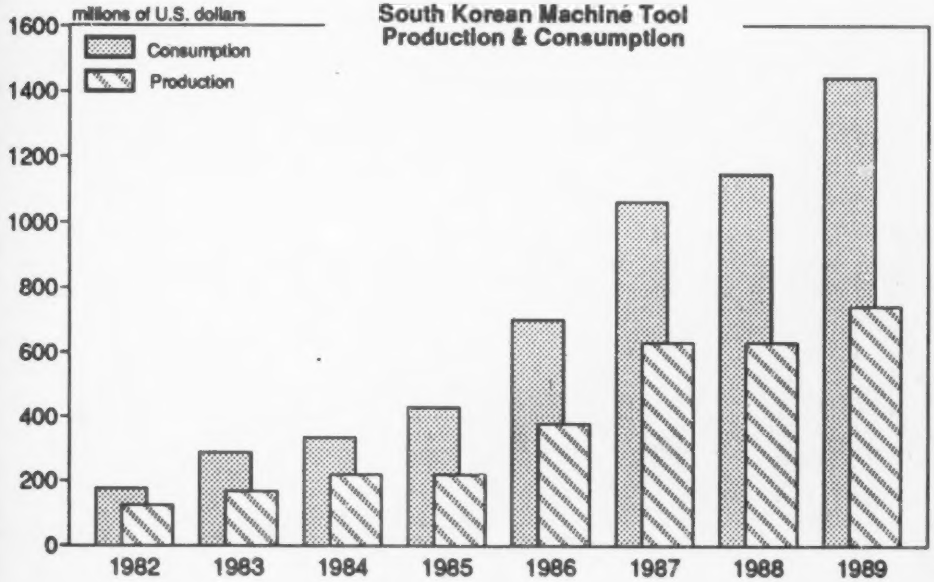
Japanese Machine Tool Orders
Metal Cutting, 1989



THE SOUTH KOREAN MACHINE TOOL INDUSTRY
1982–1989
(millions of U.S. dollars)

	Production	Exports	Imports	Consumption	% import Penetration	Exports as % of Prod.
1982	$124.8	$35.8	$88.8	$177.8	49.9%	28.6%
1983	167.9	22.0	143.3	289.2	49.6	13.1
1984	219.9	22.1	138.5	336.3	41.1	10.1
1985	220.7	24.0	233.9	430.6	54.3	10.9
1986	380.1	27.1	349.8	702.8	49.8	7.1
1987	632.0	36.1	467.8	1,063.7	44.0	5.7
1988	632.4	53.3	570.1	1,149.2	49.6	8.4
1989(p)	744.2	80.5	779.4	1,443.1	54.0	10.8

Source: Korea Machine Tool Manufacturers' Association



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E – estimated from fragmented data, N.E.C. – not elsewhere classified

SOUTH KOREAN MACHINE TOOL IMPORTS

By Type of Machine, 1985–1989

(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL IMPORTS	$233.9	$349.8	$467.8	$570.1	$779.4
NC Lathes	8.2	17.6	17.7	23.1	25.5
NC Milling Machines	12.0	9.5	14.1	13.2	20.8
Machining Centers	6.0	8.3	10.8	13.0	32.2
Non–NC Lathes	9.9	15.3	28.1	35.4	38.8
Non–NC Milling Machines	20.8	12.3	26.5	16.2	27.8
Drilling Machines	22.6	14.5	23.0	17.0	15.4
Boring Machines	14.1	23.9	23.2	31.5	41.7
Grinding Machines	28.6	59.2	77.4	124.0	112.3
Gear Cutting Machines	4.9	17.2	32.4	37.0	35.1
Electro–Discharge Machines	8.4	9.6	17.9	18.9	24.9
Other Metal Cutting Machines	18.3	45.9	56.7	105.0	171.2
Presses	48.9	71.8	51.5	37.4	na
Wire Drawing Machines	1.8	1.6	11.4	3.0	na
Shearing Machines	1.5	8.2	6.1	12.8	na
Bending Machines	2.0	2.4	8.7	21.8	na
Forging Machines	1.7	8.9	28.3	26.6	na
Other Forming Machines	23.9	23.6	34.1	34.2	na

By Country of Origin, 1985–1989

(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL IMPORTS	$233.9	$349.8	$468.2	$570.1	$779.4
Japan	177.2	265.7	305.8	347.1	na
Taiwan	0.7	1.4	10.8	24.4	na
Singapore	0.2	0.2	0.3	0.1	na
United States	12.9	26.1	62.6	84.2	na
Canada	0.0	0.1	0.1	0.2	na
West Germany	26.8	33.4	43.3	68.5	na
United Kingdom	3.9	3.6	6.6	6.5	na
Italy	0.9	3.4	9.7	6.1	na
Switzerland	8.6	10.6	17.9	18.5	na
France	0.2	0.5	1.8	2.5	na
Sweden	1.1	0.5	2.3	3.6	na
Belgium	0.1	1.2	2.1	0.3	na
Netherlands	0.2	0.1	0.3	1.8	na
Denmark	0.4	0.4	0.3	0.5	na
Finland	(a)	0.6	0.3	0.2	na
Other Countries	0.8	1.9	3.6	5.5	na

(a) – less than $50,000 Source: Korea Machine Tool Manufacturers' Association

JAPANESE METAL CUTTING MACHINE TOOL ORDERS

By Type of Machine and User Industry 1989

(millions of U.S. dollars)

User Industry	Lathes	Drilling	Boring	Milling	Grinding	Gear Cutting	Special Purpose	Mach. Ctrs.	EDM	Other	FMS for Rotational Parts	FMS for Prismatic Parts	Total
Primary Metals	24.5	1.3	1.1	2.3	22.1	0.4	3.5	16.4	3.0	6.8	0.0	0.0	81.4
Fabric. Metal Products	89.9	10.6	1.6	25.0	35.8	0.3	11.7	25.6	5.5	24.9	0.0	1.1	232.0
Industrial Machinery	687.2	21.0	171.8	340.4	329.7	62.9	58.9	907.8	115.2	172.5	0.7	21.4	2,889.5
Electrical Machinery	135.1	5.5	5.9	29.4	55.8	1.4	16.0	73.1	17.7	21.5	0.0	5.1	366.6
Motor Vehicles	497.2	18.4	3.0	78.5	220.6	53.7	545.5	281.7	10.9	58.2	31.7	74.4	1,873.7
Ship./Transp. Equipment	40.9	0.7	9.1	7.4	5.0	2.5	10.2	46.3	0.2	5.9	0.0	1.4	129.6
Precision Instruments	120.4	1.8	2.8	10.0	52.6	0.5	20.8	46.9	4.3	9.1	0.0	3.7	272.8
Other Mach. & Equipment	120.2	5.0	1.6	24.9	9.5	0.0	0.7	95.3	10.4	13.6	0.7	0.0	281.9
Govt. Agencies, Schools	9.9	0.3	0.4	3.0	3.1	0.2	0.0	6.3	1.5	1.8	0.0	0.0	26.5
Other Domestic Users	10.1	0.0	0.2	30.9	1.3	1.5	0.1	36.8	3.6	9.2	0.0	0.0	93.6
Trading Companies	10.2	33.2	6.3	48.2	45.9	4.9	0.7	13.9	341.6	2.7	0.0	0.0	507.6
Foreign	861.2	43.6	41.5	49.3	155.0	21.3	150.3	778.5	230.9	101.3	2.8	12.1	2,448.0
TOTAL	2,606.7	141.7	245.2	649.2	936.4	149.7	818.5	2328.3	745.0	427.6	35.8	119.3	9,203.3
of which NC	2,424.9	126.1	189.6	492.8	520.9	101.6	284.5	2328.3	677.6	259.2	35.8	119.3	7,560.7

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JAPANESE METAL CUTTING MACHINE TOOL ORDERS

By Type of Machine and User Industry 1988

(millions of U.S. dollars)

User Industry	Lathes	Drilling	Boring	Milling	Grinding	Gear Cutting	Special Purpose	Maching Ctrs.	EDM	Other	Total
Primary Metals	15.6	4.2	0.4	7.3	11.7	0.1	1.1	13.7	1.6	3.6	59.3
Fabric. Metal Products	72.5	8.6	1.7	18.6	17.4	0.0	4.6	17.4	7.0	12.3	160.2
Industrial Machinery	599.3	16.9	138.0	241.7	275.1	51.8	66.6	730.4	96.6	159.3	2,375.6
Electrical Machinery	103.7	6.5	7.3	12.6	61.9	2.5	15.5	71.7	17.2	17.7	316.6
Motor Vehicles	374.2	11.4	4.5	22.0	209.7	37.4	462.8	213.3	5.4	51.2	1,391.9
Ship./Transp. Equipment	26.2	0.7	5.6	10.7	6.2	2.3	10.3	45.8	0.1	5.7	113.7
Precision Instruments	141.2	2.7	2.0	5.6	51.2	2.2	37.1	45.2	1.6	17.3	306.0
Other Mach. & Equipment	100.0	3.4	0.9	16.6	9.1	0.0	0.4	61.1	10.4	14.6	216.5
Govt. Agencies, Schools	14.7	0.0	0.5	4.0	3.8	0.5	0.1	9.7	3.4	2.3	39.1
Other Domestic Users	3.2	0.4	0.0	18.8	1.9	0.0	0.4	22.5	1.0	8.1	56.3
Trading Companies	39.6	18.5	1.3	133.8	39.2	4.6	0.2	3.5	275.3	2.3	518.3
Foreign	760.2	38.3	34.3	56.2	193.2	27.5	93.7	682.8	233.5	76.3	2,196.0
TOTAL	2,250.4	111.6	196.5	548.0	880.6	128.9	692.7	1,917.1	653.2	370.6	7,749.5
of which NC	2,051.8	98.7	115.6	401.1	394.3	64.9	198.9	1,917.1	619.7	216.1	6,078.4

Source: Japan Machine Tool Builders' Association

SOUTH KOREAN MACHINE TOOL PRODUCTION, 1985–1989

(millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987	1988	1989	1985	1986	1987	1988	1989
NC Machines:										
NC Lathes	566	1,766	1,605	1,453	1,952	$17.9	$45.1	$88.6	$84.2	$137.9
NC Milling Machines	72	74	65	107	94	3.2	4.6	5.7	11.3	10.5
Machining Centers	92	432	295	477	572	11.0	23.1	30.2	62.8	75.5
NC EDM	–	–	–	68	90	–	–	–	7.4	9.6
NC Boring Machines	–	–	–	2	12	–	–	–	0.2	2.2
NC Gear Cutting	–	–	–	12	8	–	–	–	1.8	2.4
NC Grinding Machines	–	–	239	7	15	–	–	1.3	0.7	1.3
NC Drilling Machines	–	–	–	3	14	–	–	–	0.3	2.8
NC Planing Machines	–	–	3	–	9	–	–	0.5	–	8.9
Non–NC Machines:										
Lathes	6,298	9,111	110,065	7,658	7,411	44.7	47.7	86.1	90.5	104.9
Milling Machines	3,877	4,023	5,553	3,275	3,183	24.9	32.0	43.0	55.8	64.6
Drilling Machines	3,000	10,462	7,905	6,331	5,604	5.3	10.6	13.8	19.1	22.0
Boring Machines	26	58	65	91	81	2.4	2.2	6.4	9.8	9.4
Grinding Machines	639	1,597	1,775	65,051	1,602	7.7	13.8	23.9	34.7	35.9
Electro–Discharge Mach.	149	311	669	300	228	3.7	9.9	11.9	8.4	7.9
Sawing Machines	676	967	1,771	40,354	22,867	2.0	2.4	5.9	11.4	11.3
Gear Cutting Machines	886	1,285	58,438	102	110	0.9	1.9	3.8	6.3	7.5
Tapping Machines	471	380	1,441	2,204	na	0.6	2.0	1.2	3.3	na
Shaping Machines	261	138	146	44	78	0.6	0.4	0.9	0.3	0.7
Planing Machines	10	31	17	22	17	0.7	2.3	1.1	3.0	2.7
Special Purpose Mach.	125	387	415	374	379	7.6	15.9	47.4	56.9	68.0
Other Cutting Machines	236	583	1,300	477	188	4.7	11.9	33.9	14.8	14.6
Presses	6,475	8,459	16,062	3,374	1,882	43.0	68.6	93.6	125.1	116.6
Rolling Machines	264	2,426	927	na	na	10.1	19.3	8.0	9.0	9.2
Shearing Machines	83	653	239	17	26	1.2	2.4	1.2	0.6	2.0
Wire Drawing Machines	160	281	1,391	202	70	3.0	6.8	13.6	13.3	9.6
Bending Machines	219	223	141	20	19	1.2	1.2	1.3	0.2	0.1
Other Forming Machines	2,563	5,571	11,659	402	386	24.3	56.0	109.2	1.2	3.8
Total Machine Tools	na	na	na	na	na	220.7	380.1	632.0	632.4	744.2

Source: Korea Machine Tool Manufacturers' Association. Numbers may not add to total due to rounding.

SOUTH KOREAN MACHINE TOOL EXPORTS

By Country of Origin, 1985–1989

(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL EXPORTS	$24.0	$27.1	$36.1	$53.3	$80.5
United States	9.1	10.8	13.8	18.1	na
Canada	0.3	0.6	0.4	1.0	na
Japan	3.7	4.4	3.5	8.8	na
Indonesia	1.2	0.7	0.5	0.5	na
Singapore	0.0	0.1	0.7	1.3	na
West Germany	2.7	4.2	2.8	5.2	na
United Kingdom	1.3	1.4	1.0	2.7	na
France	0.0	0.4	0.8	2.6	na
Italy	0.0	0.0	1.0	1.0	na
Netherlands	1.0	0.5	1.3	1.4	na
Australia	0.4	0.3	0.3	0.3	na
Saudi Arabia	0.1	0.2	0.3	0.2	na
Others	4.1	3.4	9.7	10.2	na

By Type of Machine, 1985–1989

(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL EXPORTS	$24.0	$27.1	$36.1	$53.3	$80.5
TOTAL METAL CUTTING	20.2	25.5	31.2	47.8	71.3
NC Lathes	6.2	11.8	17.1	24.6	37.7
NC Milling	0.0	0.0	0.0	0.0	0.1
Machining Centers	1.1	1.8	4.6	7.2	9.4
NC Drilling	0.0	0.0	0.1	0.2	0.6
NC Boring	0.0	0.1	0.0	0.0	0.0
NC Grinding	0.0	0.0	0.0	0.0	0.1
Non–NC Lathes	9.1	8.4	6.0	6.4	6.3
Non–NC Milling	2.0	1.0	1.0	2.0	4.2
Non–NC Drilling	0.3	0.2	0.2	0.4	1.1
Non–NC Boring	0.2	0.1	0.1	0.3	0.0
Non–NC Grinding	0.8	0.5	0.6	0.9	3.0
Gear Cutting	0.1	0.5	0.3	0.1	0.9
Electrical Discharge	0.1	0.0	0.1	0.7	0.2
Other Metal Cutting	0.3	0.9	1.4	5.0	7.7
TOTAL METAL FORMING	3.7	1.8	4.6	5.5	9.1
Presses	0.7	0.4	1.7	1.5	na
Drawing Machines	(a)	0.0	0.1	0.0	na
Shearing Machines	0.1	0.7	0.1	0.5	na
Bending Machines	0.1	(a)	0.1	0.7	na
Forging Machines	(a)	0.1	0.1	0.4	na
Other Metal Forming	2.5	0.6	2.5	2.4	na

(a) – less than $50,000 Source: Korea Machine Tool Manufacturers' Association

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E – estimated from fragmented data, N.E.C. – not elsewhere classified

THE TAIWANESE MACHINE TOOL INDUSTRY
1983 to 1989
(millions of U.S. dollars)

Year	Production	Imports	Exports	Consumption	% Import Penetration	Exports as % of Prod.
1983	$211.0	$113.0	$135.4	$188.6	59.9%	64.2%
1984	233.2	113.3	164.8	181.7	62.4	70.7
1985	282.2	76.7	204.5	154.3	49.7	72.5
1986	356.7	82.5	254.2	185.0	44.6	71.3
1987	577.8	214.8	379.9	412.7	52.0	65.7
1988	770.0	333.2	496.6	606.6	54.9	64.5
1989p	1,007.7	370.5	660.0	718.2	51.6	65.5

Source: Taiwan Association of Machinery Industry

TAIWAN IMPORTS AND EXPORTS OF MACHINE TOOLS
by Country, 1986 to 1989
(millions of U.S. dollars)

	1986	1987	1988	1989
TOTAL IMPORTS	$82.5	$200.4	$333.1	$370.5
Austria	(a)	(a)	3.1	na
Belgium–Luxembourg	0.3	1.5	1.4	na
East Germany	(a)	(a)	3.6	na
France	1.1	2.3	1.6	na
Italy	1.2	5.5	10.1	na
Japan	56.6	139.0	222.8	na
Switzerland	4.3	13.3	14.3	na
United Kingdom	(a)	(a)	4.2	na
United States	6.6	15.9	33.6	na
West Germany	(a)	14.4	31.7	na
Other Countries	12.3	8.4	6.7	na
TOTAL EXPORTS	254.2	319.4	496.4	657.5
Australia	8.5	13.3	19.0	23.5
Canada	13.7	22.7	23.7	27.1
Finland	(a)	(a)	5.1	8.4
France	8.2	12.8	19.2	24.7
Hong Kong	8.1	17.0	38.9	29.1
Indonesia	2.7	3.2	8.9	11.2
Italy	1.9	11.2	20.7	40.3
Japan	14.3	9.2	19.1	39.2
Malaysia	(a)	(a)	6.6	11.6
Netherlands	3.3	7.0	9.3	11.4
Singapore	2.3	5.8	12.3	16.8
South Africa	1.3	6.9	19.1	23.3
South Korea	1.2	7.8	23.1	16.8
Spain	(a)	(a)	5.1	7.6
Sweden	2.8	6.5	11.2	22.4
Thailand	2.8	6.3	21.7	21.1
United Kingdom	9.5	19.3	33.8	46.9
United States	136.6	111.7	130.2	189.8
West Germany	14.5	21.8	25.3	38.1
Other Countries	22.6	36.9	43.9	48.3

(a) – Included in "Other Countries" Source: Taiwan Association of Machinery Industry

TAIWAN PRODUCTION, IMPORTS, EXPORTS AND CONSUMPTION
Of Machine Tools By Type of Machine, 1989

(millions of U.S. dollars)

	Production	Imports	Exports	Consumption
TOTAL MACHINE TOOLS	$1,007.7	$370.5	$660.0	$718.2
NC Lathes	125.1	11.2	51.7	84.5
Non–NC Lathes	104.1	10.7	88.3	26.5
NC Drilling Machines	0.5	3.1	0.3	3.3
Non–NC Drilling Machines	82.3	6.0	80.1	8.1
NC & Facing Milling Machines	28.2	6.0	12.3	21.9
Non–NC Milling Machines	90.0	6.9	69.1	27.8
NC Grinding Machines	2.8	6.4	0.6	8.5
Non–NC Grinding Machines	86.9	28.0	70.1	44.8
Sawing Machines	39.8	6.5	28.7	17.5
Shaping, Planing, Broaching	2.9	0.9	0.8	3.0
NC Boring Machines	1.2	4.1	0.6	4.8
Non–NC Boring Machines	8.6	6.0	2.3	12.3
Machining Centers	117.5	41.9	85.1	74.3
Gear Cutting Machines	0.5	7.8	0.3	8.1
Screw Cutting Machines	4.2	6.6	3.4	7.4
Electrical Discharge Machines	47.0	8.4	34.0	21.4
Other Metal Cutting Machines	40.5	57.5	9.3	88.7
Presses	126.4	58.4	37.1	147.7
Other Metal Forming Machines	99.4	94.1	85.9	107.6

Source: Taiwan Association of Machinery Industry. Individual items may not add to totals due to rounding.

Note: Consumption = Production + Imports – Exports.

TAIWAN PRODUCTION OF MACHINE TOOLS
By Type of Machine, 1985 to 1989

(millions of U.S. dollars)

Machine Classification	1985	1986	1987	1988r	1989p
TOTAL MACHINE TOOLS	$282.1	$356.7	$577.8	$770.0	$1,007.7
Lathes	66.3	74.5	99.2	159.7	229.2
Drilling Machines	53.4	67.3	88.9	82.0	82.8
Milling Machines	38.6	47.8	68.3	85.3	118.2
Bench Grinders	—	—	28.2	33.0	34.5
Other Grinding Machines	43.8	59.8	36.7	49.2	55.1
Sawing Machines	15.0	18.6	24.4	33.4	39.8
Shaping & Planing Machines	2.7	0.9	1.5	1.6	2.9
Boring Machines	1.1	2.3	5.2	3.3	9.8
Machining Centers	17.0	40.5	64.9	96.7	117.5
Gear Cutting Machines	0.2	0.3	0.2	0.1	0.5
Screw Cutting Machines	—	—	2.1	2.4	4.2
Electrical Discharge Machines	—	—	16.2	38.3	47.0
Other Metal Cutting Machines	17.7	14.5	46.7	14.0	40.5
Presses and Shears	24.2	27.6	47.0	92.7	126.4
Other Metal Forming Machines	2.0	2.6	48.3	78.0	99.4

Source: Taiwan Association of Machinery Industry. Individual items may not add to totals due to rounding.

TAIWAN IMPORTS AND EXPORTS OF MACHINE TOOLS

By Type of Machine, 1985 to 1989

(millions of U.S. dollars)

Machine Classifications	1985	1986	1987	1988r	1989p
TOTAL IMPORTS	$76.7	$82.5	$214.8	$333.2	$370.5
Lathes	7.6	7.8	15.8	19.4	21.9
Drilling Machines	7.0	5.6	16.4	16.8	9.1
Milling Machines	7.4	3.8	19.4	21.6	12.8
Grinding Machines	9.1	13.8	24.1	32.3	34.4
Sawing Machines	0.7	0.6	1.2	2.8	6.5
Shaping, Planing, Broaching	0.4	0.2	0.5	1.0	0.9
Boring Machines	1.7	2.0	3.1	6.8	10.1
Machining Centers	0	3.9	3.4	9.4	41.9
Gear Cutting Machines	2.4	1.1	7.9	6.5	7.8
Screw Cutting Machines	0	0	3.5	6.1	6.6
Electrical Discharge Machines	0	0	15.3	19.7	8.4
Other Metal Cutting Machines	15.9	17.1	12.4	23.6	57.5
Presses and Shearing Machines	24.5	26.4	31.0	93.8	58.4
Other Metal Forming Machines	0	0	60.8	73.5	94.1
TOTAL EXPORTS	204.5	254.2	379.9	496.6	660.0
Lathes	46.7	60.1	69.4	111.8	140.0
Drilling Machines	43.3	54.3	62.2	73.8	80.4
Milling Machines	25.9	34.7	47.8	59.7	81.4
Bench Grinders	0	0	25.4	29.7	31.1
Other Grinding Machines	35.6	44.1	25.7	34.5	39.6
Sawing Machines	11.7	14.2	17.1	23.4	28.7
Shaping, Planing, Broaching	0.8	0.9	1.1	1.1	0.8
Boring Machines	0.8	1.6	3.7	2.3	2.9
Machining Centers	13.2	33.7	38.9	58.0	65.1
Gear Cutting Machines	0.2	0.2	0.1	(a)	0.3
Screw Cutting Machines	0	0	1.3	1.5	3.4
Electrical Discharge Machines	0	0	11.4	26.8	34.0
Other Metal Cutting Machines	9.0	3.7	32.7	7.0	9.3
Presses and Shearing Machines	17.3	6.9	9.4	27.8	37.1
Other Metal Forming Machines	0	0	33.8	38.5	39.0

(a) – less than $50,000 Source: Taiwan Association of Machinery Industry. Individual items may not add to totals due to rounding.

SOUTH KOREAN MACHINE TOOL IMPORTS

By Type of Machine and Country of Origin, 1988

(millions of U.S. dollars)

	Total		Japan		Taiwan		U.S.		W. Germ.		Other	
	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
GRAND TOTAL	160,756	$570.1	138,234	$347.2	8,071	$24.4	5,137	$84.3	3,959	$68.5	5,355	$45.7
METAL CUTTING TOTAL	75,268	434.4	56,991	272.8	7,954	20.6	4,709	55.6	465	51.7	5,149	196.6
Special Working Machines	351	25.9	241	19.4	16	0.1	43	1.9	12	1.3	39	3.3
Laser Processes	26	3.5	11	1.8	–	–	9	1.6	2	(a)	4	0.1
Ultrasonic Processes	62	0.8	41	0.7	12	0.1	3	(a)	–	–	6	(a)
Electro–Discharge	182	18.9	146	15.1	4	0.1	5	0.1	4	0.6	23	3.1
Others	81	2.7	43	1.8	–	–	26	0.2	6	0.7	6	(a)
Machining Centers	na	13.0	na	7.9	6	0.4	87	3.3	2	0.6	na	0.9
Special Purpose Machines	65	35.7	57	30.9	–	–	2	1.8	1	1.1	5	2.0
Lathes	10,982	56.7	8,416	28.8	2,328	13.8	73	7.0	55	5.8	110	1.2
NC Horizontal	103	12.0	89	9.4	–	–	10	1.0	3	1.6	1	(a)
Non–NC Horizontal	9,550	17.2	8,103	6.5	1,361	8.2	17	0.4	23	1.4	46	0.7
Other NC	60	11.1	36	6.5	11	0.1	5	1.7	4	2.6	4	0.3
Other Non–NC	1,269	16.4	188	6.5	956	5.5	41	4.0	25	0.2	59	0.2
Drilling Machines	1,717	17.0	656	15.5	247	0.1	63	0.6	5	0.4	746	0.5
NC	30	3.1	27	3.1	–	–	2	(a)	1	0.1	–	–
Non–NC	1,687	13.9	629	12.5	247	0.1	61	0.6	4	0.3	746	0.5
Boring–Milling Machines	1,162	31.4	1,091	19.8	5	0.1	25	6.2	20	1.6	21	3.7
NC	62	13.6	42	9.5	–	–	8	2.2	7	0.9	5	1.0
Non–NC	1,100	17.9	1,049	10.4	5	0.1	17	4.0	13	0.7	16	2.7

continued

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SOUTH KOREAN MACHINE TOOL IMPORTS

By Type of Machine and Country of Origin, 1988

(millions of U.S. dollars)

	Total		Japan		Taiwan		U.S.		W. Germ.		Other	
	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
continued												
Milling Machines	5,885	29.5	280	18.6	4,136	4.2	37	1.4	39	2.9	1,393	2.3
NC Knee Type	13	0.7	4	0.5	–	–	1	(a)	1	0.1	7	0.1
Non–NC Knee Type	4,121	4.0	5	0.1	4,080	3.5	3	0.1	4	0.2	29	(a)
Other NC	78	12.6	39	9.9	7	0.3	10	0.6	19	1.4	3	0.5
Bed–Type	38	1.1	7	0.4	21	0.1	4	0.1	1	0.1	5	0.5
Planing	22	2.2	14	1.5	1	(a)	3	0.3	2	0.1	2	0.3
Universal Tool	23	0.6	3	0.1	13	(a)	3	(a)	3	0.3	1	0.2
Profile	6	0.7	2	0.1	1	0.2	2	0.1	1	0.3	–	–
Others	1,584	7.7	206	6.1	13	0.1	11	0.1	8	0.7	1,346	0.7
Threading & Tapping Machines	408	4.5	216	2.9	–	–	57	1.3	3	0.1	132	0.2
Grinding & Finishing Machines	525	14.4	320	9.3	121	1.2	66	2.4	5	0.7	13	0.8
NC Planing Grinding	47	4.6	20	3.3	1	(a)	24	0.8	1	0.2	1	0.3
Non–NC Planing Grinding	478	9.8	300	6.0	120	1.1	42	1.7	4	0.5	12	0.6
Other Grinding Machines	1,334	109.7	643	67.6	27	0.2	408	11.5	124	21.0	132	9.5
NC	194	36.4	127	23.7	–	–	25	6.1	13	4.4	29	2.2
Cylindrical	136	16.2	82	10.9	12	0.1	10	0.1	15	2.9	17	2.2
Internal	95	11.2	38	5.3	1	(a)	1	(a)	53	5.3	2	0.6
Centerless	71	9.7	52	7.3	4	(a)	1	(a)	7	1.9	7	0.6
Profile	53	6.6	28	4.4	–	–	3	0.1	14	1.9	8	0.3
Others	785	29.4	316	15.8	10	(a)	368	5.2	22	4.6	69	3.7
Tool Grinders	729	7.3	90	1.5	205	0.4	71	1.2	33	3.3	330	0.9
NC	10	2.0	2	0.4	–	–	5	0.7	3	0.8	–	–
Non–NC	719	5.3	88	1.0	205	0.4	66	0.5	30	2.4	330	0.9
Honing & Lapping Mech.	7,063	29.5	1,161	15.7	39	(a)	3,603	3.9	48	7.6	2,212	2.2
continued												

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SOUTH KOREAN MACHINE TOOL IMPORTS

By Type of Machine and Country of Origin, 1988

(millions of U.S. dollars)

	Total		Japan		Taiwan		U.S.		W. Germ.		Other	
	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
continued												
Planing Machines	18	5.0	11	0.7	–	–	4	3.9	3	(a)	–	–
NC	2	0.1	1	0.1	–	–	–	–	1	(a)	–	–
Non–NC	16	4.9	10	0.6	–	–	4	3.9	2	(a)	–	–
Shaping & Slotting mach.	35	1.3	23	0.7	2	(a)	6	0.6	1	(a)	3	0.1
Broaching Machines	177	4.0	162	2.2	–	–	14	1.9	–	–	1	(a)
Gear Cutting Machines	280	37.1	194	25.6	–	–	33	6.0	29	3.8	24	1.6
NC	131	24.0	108	19.6	–	–	10	2.6	2	1.2	11	0.5
Non–NC	131	11.1	79	5.6	–	–	21	3.1	20	1.9	11	0.6
Gear Grinding Mach.	18	2.0	7	0.4	–	–	2	0.3	7	0.7	2	0.6
Sawing & Cut–Off Mach.	2,682	5.1	1,692	3.6	784	0.1	99	0.7	83	0.7	24	0.2
Other Metal Cutting	41,855	7.2	41,736	2.3	38	(a)	18	(a)	2	1.0	59	3.8
METAL FORMING TOTAL	85,488	135.7	81,242	74.5	117	3.8	428	28.6	3,494	16.7	207	12.0
Forging Machines	80,382	26.6	80,247	15.1	42	1.1	38	8.7	1	0.3	54	1.4
Air Hammers	40	0.7	25	0.8	–	–	15	(a)	–	–	–	–
Other Forging	80,342	25.7	80,222	14.2	42	1.1	23	8.7	1	0.3	54	1.4
Bend, Fold, Straighten.	296	21.8	168	12.3	9	0.3	65	1.6	27	2.1	27	5.6
Punching & Shearing	287	19.9	209	16.2	10	0.5	46	2.1	12	0.9	10	0.3
NC	122	8.3	111	7.5	–	–	5	0.4	5	0.5	1	0.1
Non–NC	165	11.5	98	8.7	10	0.5	41	1.6	7	0.6	9	0.2
Presses	4,023	37.4	280	18.0	14	0.5	210	10.8	3,416	6.6	103	1.6
Hydraulic Presses	207	10.7	52	2.9	–	–	131	1.9	9	5.3	15	0.6
Other Presses	3,816	26.8	228	13.0	42	1.5	79	8.9	3,407	1.3	60	2.1
Drawing Machines	76	3.0	61	0.7	–	–	4	0.4	10	1.7	1	0.2
Thread Rolling Machines	40	1.3	32	0.9	3	0.3	4	0.1	1	(a)	–	–
Machines for Working Wire	71	5.9	45	1.0	3	(a)	7	0.8	8	2.1	8	2.0
Other Forming Machines	313	19.8	200	10.3	36	1.2	54	4.3	16	2.0	7	2.1

(a) – less than $50,000 Source: Korea Machine Tool Manufacturers' Association

MALAYSIAN MACHINE TOOL IMPORTS 1987

(millions of U.S. dollars)

	Total		Japan		Taiwan		U.K.		W. Germ.		U.S.		Singapore		Others	
	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
TOTAL	13,362	$53.6	4,988	$35.0	3,104	$4.5	452	$2.6	541	$1.9	475	$1.8	973	$1.8	2,829	$6.0
EDM[1]	45	0.3	3	(a)	41	0.3	–	–	–	–	–	–	1	(a)	–	–
Gear Cutting	73	0.4	32	0.3	2	(a)	4	(a)	24	0.1	6	(a)	3	(a)	2	(a)
Lathes	529	5.1	106	3.2	143	0.7	97	0.5	16	0.3	19	(a)	52	0.1	96	0.3
Milling Machines	327	2.4	45	0.7	144	0.6	49	0.4	2	(a)	3	(a)	17	0.1	67	0.6
Drill, Bore	1,358	1.8	196	0.9	212	0.1	44	0.1	13	0.1	16	(a)	22	(a)	855	0.6
Sawing	2,303	1.3	1,780	0.9	108	0.1	9	(a)	18	(a)	11	(a)	117	(a)	260	0.1
Planing Machines	33	(a)	23	(a)	2	(a)	4	(a)	–	–	–	–	–	–	4	(a)
Thread & Tap	247	0.6	124	0.4	41	0.1	39	(a)	2	(a)	9	(a)	18	(a)	14	(a)
Grinding	2,309	11.6	420	9.4	622	0.4	80	0.1	101	0.2	74	0.1	307	0.6	705	0.8
Forge & Stamp	142	0.8	38	0.5	622	0.4	45	0.2	–	–	3	(a)	7	(a)	35	0.1
Bend, Flatten	1,734	2.9	202	1.5	1,289	0.6	15	(a)	50	0.3	12	(a)	30	0.1	136	0.4
Punch & Shearing	389	3.0	84	2.4	34	0.1	10	(a)	182	0.1	–	–	21	(a)	58	0.4
Presses	810	8.0	260	6.3	74	0.5	8	0.3	41	0.1	19	(a)	101	0.1	307	0.7
Other	3,063	15.4	1,675	8.5	378	1.0	48	1.0	92	0.9	303	1.5	277	0.6	290	1.9

[1] Includes electro–erosion, other electric, electronic and ultrasonic machine tools. (a) – less than $50,000 Source: Malaysia External Trade Statistics, 1987

SINGAPORE MACHINE TOOL IMPORTS 1987–1989

By Type of Machine

(millions of U.S. dollars)

	1987		1988		1989	
	Units	Value	Units	Value	Units	Value
TOTAL MACHINE TOOLS	16,325	138.5	21,263	208.5	33,619	221.6
Physico–Electro	68	1.3	80	1.5	316	7.5
Lathes	1,132	17.7	1,942	30.3	2,292	37.9
Milling Machines	880	10.2	1,028	15.4	2,028	23.3
Boring & Drilling	1,968	9.7	2,620	14.7	1,378	9.4
Gear Cutting Machines	106	0.8	104	1.6	577	2.7
Threading & Tapping	462	2.5	654	5.0	1,263	3.9
Sawing Machines	963	2.9	919	4.3	2,183	10.0
Planing Machines	11	(a)	15	0.2	9	0.1
Grinding Machines	2,170	23.4	2,949	36.5	4,292	28.9
Forging & Stamping	255	3.1	209	3.5	472	5.8
Bend, Fold, Straighten	1,097	8.0	752	7.0	1,024	7.2
Punching & Shearing	1,263	9.1	2,258	10.5	2,274	11.2
Presses	2,027	25.9	3,251	39.7	4,611	30.4
Other Machine Tools	3,923	23.7	4,482	38.2	10,900	43.3

(a) – less than $50,000 Source: Singapore External Trade Statistics

THAILAND IMPORTS OF MACHINE TOOLS

By Country of Origin, 1986–1988

(millions of U.S. dollars)

	1987		1988		1989	
	Value	% of Total	Value	% of Total	Value	% of Total
TOTAL	$37.9	100.0	$82.4	100.0	$183.3	100.0
Japan	17.8	47.0	45.1	54.7	113.1	61.7
Taiwan	4.2	11.1	12.9	15.7	20.9	11.4
West Germany	2.6	7.0	8.2	10.0	8.8	4.8
Switzerland	5.5	14.4	2.6	3.2	9.4	5.1
China	0.6	1.6	1.5	1.9	6.7	3.7
Italy	0.6	1.6	2.2	2.6	2.2	1.2
United Kingdom	1.4	3.7	2.1	2.6	(a)	(a)
United States	2.0	5.5	2.9	3.5	8.0	4.3
All others	3.1	8.2	4.9	5.9	14.2	7.8

(a) – less than $50,000 Source: Thai Customs

THAILAND IMPORTS OF MACHINE TOOLS

By Type of Machine and Country of Origin, 1988

(millions of U.S. dollars)

	Total	Japan	Taiwan	U.S.	Switz.	W.Germ.	China	Others
Total Machine Tools	$183.3	$113.1	$20.9	$8.0	$9.4	$8.8	$6.7	$16.5
EDM/ECM/laser/photon	4.2	2.0	0.7	(a)	1.2	(a)	0.1	0.1
Machining Centers	4.3	3.8	0.1	–	–	0.2	–	0.2
Lathes	42.7	24.1	4.3	0.4	5.7	2.3	3.4	2.5
Drilling Machines	5.7	2.4	1.4	0.3	0.2	0.2	0.4	0.8
Boring Machines	5.2	3.3	0.1	0.1	(a)	0.6	0.1	1.0
Milling Machines	8.9	4.3	1.2	0.2	0.4	0.6	0.7	1.6
Threading & Tapping	2.7	1.3	1.2	(a)	0.1	(a)	(a)	0.1
Station Type Machines	1.0	0.3	0.3	(a)	0.2	(a)	0.1	0.1
Grinding Machines	21.8	14.9	1.5	0.8	0.5	1.5	0.6	2.0
Plane, Shape, Broach	4.8	2.9	0.4	0.1	(a)	0.2	0.5	0.6
Gear Cutting Machines	1.3	0.6	0.1	(a)	–	0.1	0.2	0.3
Sawing or Cutting–off	7.2	4.5	0.5	0.9	(a)	0.3	0.1	0.9
Other Metal Cutting	6.1	4.2	0.8	0.3	0.4	0.2	0.1	0.2
Forging, Hammers	18.1	11.9	2.2	2.2	0.3	0.5	(a)	0.9
Bending & Forming	8.4	5.5	0.6	0.2	(a)	0.6	(a)	1.4
Punching & Shearing	11.3	9.4	0.9	0.4	(a)	0.2	(a)	0.4
Presses	21.8	13.5	3.2	1.9	0.1	0.9	0.3	2.0
Thread Rolling	0.5	0.2	0.3	–	–	(a)	–	(a)
Wire Working	2.7	1.1	0.5	0.1	0.3	0.2	0.1	0.5
Draw Benches	0.6	0.5	(a)	(a)	–	(a)	–	(a)
Riveting Machines	1.3	1.2	0.1	(a)	–	–	–	(a)
Other Metal Forming	3.0	1.3	0.5	0.1	–	(a)	(a)	1.0

(a) – less than $50,000 Source: Thai Customs Numbers may not add to totals due to rounding.

INDIAN MACHINE TOOL EXPORTS
By Type of Machine, 1985–1989
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL EXPORTS	$22.2	$33.4	$45.7	$22.6	$30.4
Lathes	7.1	11.6	7.8	8.1	14.2
Boring Machines	0.3	1.7	2.4	0.1	(a)
Broaching Machines	(a)	–	0.3	–	(a)
Drilling Machines	0.2	0.3	0.7	0.3	0.4
Grinding Machines	3.0	10.8	8.8	6.9	1.9
Milling Machines	10.9	4.0	6.9	2.7	5.5
Threading Machines	0.2	0.4	0.2	0.1	(a)
Sawing & Cut–Off Machines	(a)	(a)	(a)	(a)	(a)
Shaping Machines	(a)	–	(a)	0.2	(a)
Gear Cutting Machines	0.3	–	0.8	1.6	1.8
Electro–Chemical Machines	(a)	(a)	0.3	1.8	2.4
Machining Centers	–	3.4	7.0	–	–
Presses	(a)	0.8	(a)	0.1	3.5
Shearing Machines	(a)	(a)	(a)	–	(a)
Wire Forming Machines	0.1	0.1	0.4	0.5	0.3
Other Machine Tools	(a)	0.2	0.1	0.3	0.3

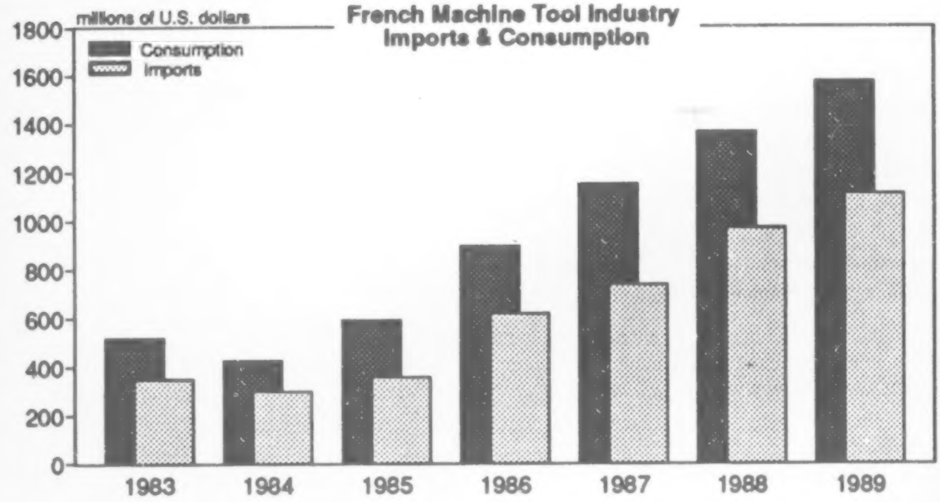
(a) – less than $50,000 Source: Indian Machine Tool Manufacturers' Association

THE FRENCH MACHINE TOOL INDUSTRY
1980 to 1989
(millions of U.S. dollars)

Year	Production	Imports	Exports	Consumption	% Import Penetration	Exports as % of Prod.
1980	$995.3	$554.1	$515.9	$1,033.5	53.6%	51.8%
1981	na	566.6	390.5	na	na	na
1982	na	479.3	195.0	na	na	na
1983	464.5	351.1	295.2	520.4	67.5	63.6
1984	376.7	301.2	250.1	427.8	70.4	66.4
1985	444.7	357.5	208.6	593.6	60.2	46.9
1986	588.1	618.0	308.1	898.0	68.8	52.4
1987	697.3	738.1	284.3	1,151.1	64.1	40.8
1988	790.6	971.1	396.1	1,365.6	71.1	50.1
1989	879.4	1,110.5	415.9	1,574.0	70.6	47.3

Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associes.

THE FRENCH MACHINE TOOL INDUSTRY



FRENCH MACHINE TOOL INDUSTRY
Selected Data, 1985 to 1989
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
Employment	12,050	11,450	10,025	9,190	na
Production Workers	6,670	6,160	5,375	na	na
Others	5,380	5,290	4,650	na	na
Compensation	149.8	197.8	211.3	193.2	na
Wages	65.3	82.8	88.4	na	na
Salaries	84.5	115.0	122.9	na	na
Orders(a)	490.4	613.9	757.3	903.2	1,029.3
Domestic	301.9	410.3	497.6	644.5	724.3
Foreign	188.5	203.6	259.7	258.7	305.0
Shipments(a)	499.3	657.4	766.1	872.9	966.0

(a) – Excluding Tax. Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associee. Individual items may not add to totals due to rounding.

MALAYSIAN MACHINE TOOL IMPORTS 1988

(values in thousands of U.S. dollars)

	Total		Japan		Taiwan		U.K.		W.Germ		U.S.		Singapore		Others	
	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
TOTAL MACHINE TOOLS	26,191	$75.3	10,654	$33.3	3,294	$10.8	1,450	$5.9	847	$4.9	1,037	$4.2	2,954	$6.6	5,955	$9.7
EDM	296	2.2	74	0.5	82	1.0	2	(a)	17	0.4	54	0.1	17	0.1	50	(a)
Machining Centers	7	0.6	2	0.2	0	0	0	0	0	0	0	0	5	0.3	0	0
Unit Construction	5	(a)	0	0	0	0	0	0	0	0	5	(a)	0	0	0	0
NC Horiz. Lathes	56	0.6	8	0.3	7	0.1	6	0.1	0	0	1	(a)	1	0.1	33	0.1
Other NC Lathes	28	1.4	18	1.2	0	0	4	0.1	1	(a)	1	(a)	3	(a)	1	(a)
Non–NC Horiz. Lathes	268	2.1	18	0.7	72	0.4	22	0.1	11	0.3	5	(a)	2	(a)	138	0.6
Other Non–NC Lathes	654	6.0	163	2.2	256	1.4	76	0.3	31	0.8	23	0.6	12	0.1	93	0.5
Way–Type Unit Head	9	(a)	0	0	6	(a)	0	0	0	0	0	0	2	(a)	1	(a)
NC Drilling	25	0.4	4	0.1	0	0	0	0	0	0	1	(a)	0	0	20	0.2
Non–NC Drilling	3,830	1.7	448	0.2	213	0.2	40	0.1	58	0.1	433	0.6	47	(a)	2,591	0.5
NC Boring–Milling	1	0.1	0	0	0	0	0	0	0	0	1	0.1	0	0	0	0
Non–NC Boring–Milling	36	0.3	7	(a)	6	(a)	3	0.1	0	0	11	0.1	1	(a)	8	0.1
Other Milling–Boring	91	1.0	12	0.1	14	0.1	11	0.6	2	0.1	0	0	5	(a)	47	0.2
NC Milling Machines	45	0.5	3	0.3	33	0.1	1	(a)	2	(a)	0	0	0	0	6	(a)
Non–NC Milling	1,020	3.4	59	0.6	343	1.4	90	0.4	10	0.1	11	(a)	439	0.4	68	0.5
Threading & Tapping	381	1.2	172	1.0	82	0.1	26	(a)	1	0	27	(a)	1	(a)	72	(a)
NC Flat Surf. Grind.	26	1.0	9	0.9	4	(a)	1	(a)	1	(a)	0	0	2	(a)	9	(a)
Non–NC Flat Surf. Gr	412	0.9	176	0.1	81	0.4	16	0.1	1	(a)	52	(a)	18	0.2	68	0.1
Other NC Grinding	39	1.7	37	1.7	1	(a)	0	0	1	(a)	0	0	0	0	0	0
Other Non–NC Grind.	425	1.6	102	0.4	134	0.2	25	0.1	18	0.2	5	(a)	56	0.6	87	0.2

continued

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MALAYSIAN MACHINE TOOL IMPORTS 1988

(values in thousands of U.S. dollars)

continued

	Total		Japan		Taiwan		U.K.		W.Germ		U.S.		Singapore		Others	
	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
NC Sharpening Machines	8	(a)	0	0	0	0	1	(a)	0	0	1	0	2	(a)	4	(a)
Non–NC Sharpening	252	0.6	91	0.4	83	0.1	14	(a)	7	(a)	23	(a)	22	(a)	12	0.1
Honing & Lapping	47	0.8	24	0.7	11	0.1	5	(a)	0	0	3	(a)	0	0	4	(a)
Tool or Cutter Grind.	1,262	2.4	737	1.6	367	0.3	40	73	45	0.1	16	0.1	36	(a)	21	0.2
Shaping & Slotting	207	0.4	12	(a)	67	0.1	11	(a)	2	(a)	0	0	2	(a)	113	0.2
Broaching Machines	7	(a)	1	(a)	6	(a)	0	0	0	0	0	0	0	0	0	0
Gear Cutting Mach.	194	0.9	54	0.4	22	0.1	6	(a)	4	0.1	49	0.1	14	(a)	45	0.2
Sawing & Cut–Off	2,881	1.8	1,927	1.1	222	0.2	27	0.1	16	(a)	21	0.1	162	(a)	506	0.3
Planing Machines	159	0.2	156	0.2	0	0	2	(a)	0	0	0	0	0	0	1	(a)
Other Metal Cutting	2,590	4.7	1,007	2.5	153	0.4	96	0.4	69	0.3	86	0.2	575	0.4	604	0.4
Forging Machines	790	2.0	59	0.6	30	0.3	617	0.8	1	(a)	3	(a)	14	(a)	66	0.3
Bending, Folding	2,739	5.4	260	1.4	410	0.5	151	0.2	236	1.3	11	(a)	1,100	0.3	571	1.8
NC Punching & Shearing	40	0.6	5	0.5	5	(a)	0	0	11	(a)	0	0	3	(a)	16	(a)
Non–NC Punch & Shear	1,250	6.6	607	3.9	131	0.6	44	0.7	140	0.2	17	0.4	74	0.2	237	0.6
Presses	4,795	13.9	3,937	6.8	192	1.6	66	1.6	49	0.4	84	1.0	131	0.3	336	2.2
Draw Benches	88	0.3	9	0.2	1	(a)	1	(a)	60	(a)	4	(a)	1	(a)	12	(a)
Thread Rolling Mach.	18	0.1	6	0.1	7	(a)	0	0	0	0	1	(a)	2	(a)	2	(a)
Wire Working Machines	145	4.4	57	0.9	15	0.1	0	0	4	(a)	14	0.2	45	3.0	10	0.1
Other Metal Forming	1,065	3.6	393	1.4	238	1.0	46	0.2	51	0.3	74	0.2	160	0.3	103	0.3

(a) – less than $50,000 Source: Malaysia External Trade Statistics 1988

INDIAN MACHINE TOOL PRODUCTION

By Type of Machine, 1985–1989

(millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987	1988	1989	1985	1986	1987	1988	1989
TOTAL MACHINE TOOLS	9,284	11,068	10,338	10,354	7,901	$158.1	$176.3	$184.1	$193.0	$208.0
Gear Cutting Machines	45	60	48	51	62	2.0	4.6	3.7	3.4	3.8
Lathes	4,064	4,496	4,263	4,138	3,174	56.7	53.3	56.0	54.3	69.1
NC Lathes	na	27	89	113	27[illegible]	na	3.9	14.4	16.9	30.3
Boring, Boring–Milling	86	66	93	103	199	9.9	7.6	11.9	11.4	11.9
NC Boring, Bore–Mill	na	–	15	28	9	na	–	1.4	2.1	1.8
Grind, Hone, & Lap	936	1,863	1,718	1,940	1,024	13.5	23.6	21.7	28.3	16.0
NC Grind, Hone, Lap	na	–	1	25	6	na	–	0.2	4.9	1.2
Milling Machines	1,173	1,305	1,392	1,259	1,280	18.4	17.9	17.8	21.8	15.7
NC Milling Machines	na	6	4	9	17	na	0.3	0.3	2.1	1.6
Drilling Machines	1,563	1,540	1,118	1,300	651	8.6	11.0	7.9	7.5	5.8
NC Drilling Machines	na	2	2	–	10	na	0.1	0.1	–	0.7
Machining Centers	24	50	73	68	96	3.3	9.2	18.8	20.4	25.1
Broach, Shape, Slot, Plane	209	212	112	97	80	4.6	6.3	3.4	3.1	2.5
Threading & Tapping	50	73	104	100	45	0.8	0.9	1.6	1.1	0.6
Sawing & Cut–Off Machines	253	240	236	160	116	1.0	0.5	0.6	0.3	0.3
EDM, Spark Erosion	(a)	113	113	100	122	(a)	2.0	2.9	2.2	4.8
Bend, Fold, Straighten	(a)	135	129	225	102	(a)	4.2	2.7	2.6	3.8
Presses	373	501	524	450	358	15.7	15.7	16.2	12.9	19.5
Punching & Shearing	(a)	78	162	110	51	(a)	2.1	2.4	2.5	1.4
Forging Machines	19	23	12	15	18	2.6	1.8	0.9	1.4	3.2
Wire Working Machines	(a)	–	4	15	50	(a)	–	0.1	1.2	0.3
Special Purpose Machines	(a)	236	171	170	414	(a)	15.5	14.7	18.0	24.0
Other Machine Tools	489	77	66	53	59	21.0	0.3	0.6	0.4	0.2

(a) – Included in "Other Machine Tools" Source: Indian Machine Tool Manufacturers' Association

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FRENCH PRODUCTION OF METAL CUTTING MACHINE TOOLS
By Type of Machine, Units and Value, 1986 to 1989
(millions of U.S. dollars)

	UNITS				VALUE			
	1986	1987	1988	1989	1986	1987	1988	1989
TOTAL METAL CUTTING MACHINES,	32,918	27,416	27,821	na	$471.3	$556.1	$602.7	$662.9
NC	1,876	2,259	2,641	na	334.0	394.3	468.9	na
non–NC	31,042	25,157	25,180	na	137.3	161.8	133.8	172.3
Vertical Machining Centers	165	176	144	125	27.8	20.2	20.7	21.0
Horizontal Machining Centers	98	89	112	166	25.1	26.5	31.7	51.7
Engine & Turret Lathes, NC	435	361	333	520	50.0	40.5	43.1	55.8
Turning Centers, NC	78	28 (d)	40	69	6.8	4.7(d)	5.8	7.2
Other Lathes, NC	155 (c)	204 (c)	244	336	39.6(c)	38.7(c)	45.5	57.6
Engine Lathes, non–NC	580	327	215	239	13.0	10.2	8.5	9.3
Single–Spindle Automatic Lathes, non–NC	36	(a)	(a)	(a)	1.1	(a)	(a)	(a)
Other Lathes, non–NC	25	(a)	(a)	(a)	1.6	(a)	(a)	(a)
Comb. Boring & Milling Mach.	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Boring Machines	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Knee–Type Milling Machines, non–NC	454	228	107	155	12.9	8.9	4.0	6.3
Knee–Type Milling Machines, NC	211	86	184	207	15.2	8.4	15.5	16.6
Bed–Type Milling Machines, non–NC	63	297	60 (e)	35 (e)	2.5	6.3	4.5	4.3(e)
Bed–Type Milling Machines, NC	158	131	215 (e)	283 (e)	55.0	35.1(e)	58.7(e)	86.1(e)
Other Milling Machines, non–NC	508	6,299	(f)	(f)	6.3	(f)	(f)	(f)
Drilling Machines, NC	(a)	(a)	—	(a)	(a)	(a)	—	(a)
Comb. Drilling & Boring Machines, NC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Radial Drilling Machines, non–NC	81	39	(a)	(a)	1.0	0.2	(a)	(a)
Bench Type Drilling Machines, non–NC	2,301	1,738	1,692	(a)	2.9	2.7	2.7	(a)
Pillar Type Drilling Machines, non–NC	987	570	626	(a)	3.1	2.0	2.4	(a)
Column Type Drilling Machines, non–NC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)

continued

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FRENCH EXPORTS OF MACHINE TOOLS

By Destination and Value, 1985 to 1989

(millions of U.S. dollars)

Destination	1985	1986	1987	1988	1989
TOTAL EXPORTS	$208.6	$308.1	$284.3	$396.1	$415.9
West Germany	27.3	39.2	50.7	43.9	71.3
Italy	8.8	19.0	21.2	34.3	39.4
East Germany	9.6	21.6	5.8	39.1	39.1
United States	18.8	41.0	15.0	20.9	37.0
United Kingdom	12.7	16.6	17.4	38.6	31.4
Switzerland	9.1	18.0	18.8	26.5	23.4
Belgium–Luxembourg	7.2	13.2	12.3	18.3	20.9
Spain	4.8	6.4	12.4	14.1	20.6
Algeria	13.2	24.6	13.6	12.2	11.2
Portugal	1.3	2.0	3.1	2.6	7.2
Soviet Union	10.8	5.5	24.0	20.6	6.8
Sweden	2.8	3.9	4.8	6.0	5.2
Netherlands	3.3	5.3	5.4	8.1	5.1
Morocco	3.2	3.3	2.7	5.1	5.1
Austria	1.7	3.2	2.3	3.4	na
Finland	0.9	3.5	2.5	2.3	na
Turkey	4.4	3.8	na	3.3	na
Czechoslovakia	1.3	3.7	1.9	1.8	na
Yugoslavia	4.0	0.6	0.7	3.5	na
Canada	3.1	6.6	4.5	3.5	na
Mexico	2.9	0.9	na	4.8	na
India	6.0	2.8	2.9	3.7	na
Japan	1.0	1.5	2.2	1.7	na
People's Rep. of China	4.3	5.8	4.5	3.6	na
Australia	2.7	5.7	4.4	1.7	na
Other Countries	69.4	49.4	48.5	71.1	92.2

na – not available, exports, if any, are included in "Other Countries". Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associee.

FRENCH EXPORTS OF MACHINE TOOLS
By Type of Machine and Value, 1986 to 1989
(millions of U.S. dollars)

	1986	1987	1988	1989
TOTAL MACHINE TOOL EXPORTS	$308.1	$284.3	$396.1	$415.9
METAL CUTTING TOTAL	190.8	167.8	254.1	258.2
Physico–Chemical Machines	6.8	6.0	31.9	25.6
Boring Machines (including NC)	9.0	3.2	6.4	4.7
Boring Machines, NC	5.0	1.3	1.3	2.4
Drilling Machines (including NC)	22.8	10.8	11.8	7.8
Drilling Machines, NC	14.6	2.3	1.5	2.9
Gear Cutting Machines (including NC)	1.0	2.7	1.4	2.0
Grinding Machines (including NC)	28.0	31.1	31.7	32.7
Lathes (including NC)	57.0	53.0	59.9	56.3
Lathes, NC	16.3	18.5	45.7	42.5
Milling Machines (including NC)	40.0	35.5	44.8	52.2
Milling Machines, NC	18.1	19.9	35.4	42.0
Machining Centers	(a)	(a)	37.6	44.1
Transfer Machines	(a)	(a)	9.7	10.4
Threading & Tapping Machines	1.2	1.9	2.1	2.3
Sawing & Cut–off Machines	10.6	10.0	9.3	14.6
Shaping, Broaching, Slotting	(b)	(b)	4.3	1.5
Other Metal Cutting Machines	14.4	13.5	3.2	4.0
METAL FORMING TOTAL	117.3	116.5	142.1	157.7
Hydraulic Presses (including NC)	9.4	13.8	20.6	16.5
Hydraulic Presses, NC	2.2	8.3	16.1	10.5
Other Presses (including NC)	13.5	18.7	14.3	11.6
Other Presses, NC	0.5	(c)	0.5	1.5
Forging & Stamping Machines (incl. NC)	0.8	1.5	24.6	12.2
Forging & Stamping, NC	(c)	(c)	0.9	1.1
Punching & Shearing (including NC)	19.4	25.5	36.3	54.1
Punching & Shearing, NC	3.5	9.1	16.3	27.0
Bending, Folding, Forming (incl. NC)	23.8	15.6	23.9	37.3
Bending, Folding, Forming, NC	4.1	2.2	5.1	17.9
Wire Drawing Machines	3.3	4.6	7.8	5.3
Other Metal Forming Machines	47.1	36.7	14.5	20.8

(a) – included in "other metal cutting machines" (b) – included in sawing & cut–off machines (c) – less than $50,000
Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associes. Individual items may not add to totals due to rounding.

FRENCH IMPORTS OF MACHINE TOOLS
By Source Country and Value, 1985 to 1989
(millions of U.S. dollars)

Source Country	1985	1986	1987	1988	1989
TOTAL IMPORTS	$357.5	$618.0	$738.1	$971.1	$1,110.5
West Germany	111.2	182.7	225.6	295.3	336.9
Italy	64.8	119.8	152.8	166.7	192.2
Japan	53.7	77.5	84.6	127.2	143.9
Switzerland	51.4	91.2	108.2	125.4	141.4
United Kingdom	14.4	26.4	35.3	62.2	64.6
Spain	8.6	17.6	22.4	33.1	46.9
United States	11.9	30.3	24.8	30.9	40.4
Belgium–Luxembourg	9.8	22.0	17.5	28.8	26.9
Taiwan	5.0	7.4	14.1	21.0	26.4
Austria	3.6	4.9	8.9	11.7	15.1
Sweden	3.9	6.5	5.3	6.1	13.5
East Germany	2.9	7.3	6.6	6.7	10.3
Netherlands	3.5	4.7	3.8	7.2	8.4
Soviet Union	1.7	1.4	2.9	3.4	4.1
Other Countries	11.1	18.3	25.3	45.4	39.5

Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associes.

FRENCH IMPORTS OF MACHINE TOOLS
By Type of Machine and Value, 1986 to 1989
(millions of U.S. dollars)

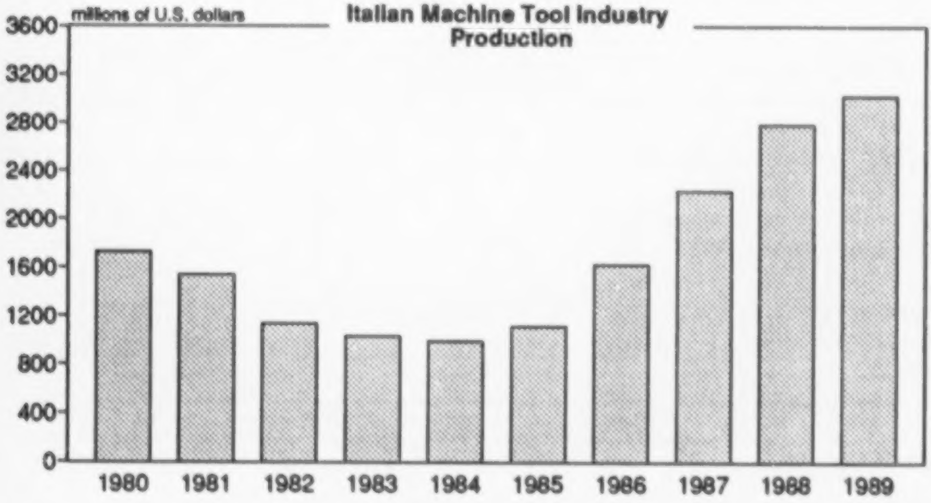
	1986	1987	1988	1989
TOTAL MACHINE TOOL IMPORTS	$618.0	$738.1	$971.1	$1,110.5
METAL CUTTING TOTAL	461.1	548.2	758.9	850.1
Physico-Chemical Machines	36.4	36.9	75.9	86.3
Boring Machines (including NC)	31.1	26.2	37.9	34.7
Boring Machines, NC	25.6	19.3	30.7	25.6
Drilling Machines (including NC)	21.7	31.9	35.9	26.6
Drilling Machines, NC	12.4	14.0	10.8	9.4
Gear Cutting Machines (including NC)	9.8	13.8	23.7	29.0
Gear Cutting, NC	6.0	6.9	15.7	14.3
Grinding Machines (including NC)	80.3	117.4	131.6	139.9
Lathes (including NC)	112.5	128.5	161.0	201.9
Lathes, NC	78.3	90.7	123.4	155.3
Machining Centers	(a)	(a)	114.0	145.6
Transfer Machines	(a)	(a)	62.0	59.5
Milling Machines (including NC)	58.4	81.1	66.3	68.4
Milling Machines, NC	37.3	52.3	44.9	49.4
Threading & Tapping Machines	3.0	3.5	5.7	9.7
Sawing & Cut-off Machines	22.5	18.6	29.7	33.0
Shaping, Broaching, Slotting	(b)	1.2	9.3	7.9
Other Metal Cutting Machines	86.0	89.1	5.9	4.0
METAL FORMING TOTAL	156.9	189.9	212.2	260.4
Hydraulic Presses (including NC)	10.9	9.7	19.7	21.8
Hydraulic Presses, NC	3.4	3.5	8.3	7.2
Other Presses (including NC)	31.6	29.7	20.4	28.6
Other Presses, NC	5.1	2.1	0.8	0.6
Forging & Stamping (including NC)	2.9	5.9	16.5	12.7
Forging & Stamping, NC	0.1	1.1	5.6	3.0
Punching & Shearing (including NC)	41.1	54.8	75.9	89.1
Punching & Shearing, NC	26.1	32.6	47.7	53.4
Bending, Folding, Forming (incl. NC)	20.7	25.1	44.8	54.9
Bending, Folding, Forming, NC	4.9	6.0	13.9	21.1
Wire Drawing Machines	13.4	11.2	12.3	12.3
Other Metal Forming Machines	36.3	53.5	22.6	41.0

(a) – included in "other metal cutting machines" (b) – included in sawing & cut-off machines (c) – less than $50,000
Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associes. Individual items may not add to totals due to rounding.

THE ITALIAN MACHINE TOOL INDUSTRY
1975 to 1989
(millions of U.S. dollars)

Year	Production	Imports	Exports	Consumption	% Import Penetration	Exports as % of Prod.
1975	$ 842.5	$ 212.9	$ 432.1	$ 623.3	34.2%	51.3%
1976	750.9	160.5	359.0	552.4	29.1	47.8
1977	878.3	192.9	442.4	628.8	30.7	50.4
1978	1,060.5	195.0	596.3	659.2	29.6	56.2
1979	1,354.0	255.9	689.0	920.9	27.8	50.9
1980	1,728.1	356.4	847.6	1,236.9	28.8	49.0
1981	1,539.4	300.3	795.2	1,044.5	28.8	51.7
1982	1,138.6	208.6	639.9	707.3	29.3	56.2
1983	1,037.0	181.8	603.4	615.4	29.0	58.2
1984	996.0	182.5	558.0	620.5	29.4	56.0
1985	1,115.5	196.4	707.4	604.5	32.5	63.4
1986	1,624.6	346.8	969.7	1,001.7	34.6	59.7
1987	2,235.2	566.5	1,048.5	1,753.2	32.3	46.9
1988	2,792.7	706.1	1,309.4	2,189.4	32.2	46.9
1989	3,028.4	794.6	1,472.7	2,350.3	33.8	48.6

Source: Unione Costruttori Italiani Macchine Utensili



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E – estimated from fragmented data, N.E.C. – not elsewhere classified

ITALIAN MACHINE TOOL PRODUCTION
By Type of Machine, 1986–1989
(millions of U.S. dollars)

	1986	1987	1988	1989
MACHINE TOOL TOTAL	$1,624.6	$2,235.2	$2,792.7	$3,028.4
TOTAL CUTTING MACHINES	1,166.5	1,660.4	2,029.6	na
Lathes	199.3	289.4	365.5	na
Milling Machines	149.9	212.7	213.0	na
Boring Machines	44.3	81.2	80.1	na
Drilling Machines	26.4	43.4	52.9	na
Machining Centers	175.5	270.4	328.0	na
Grinding Machines	100.6	157.9	179.6	na
Sawing & Cut–Off Machines	58.1	78.4	104.3	na
Transfer Machines	184.7	289.6	330.6	na
Gear Cutting Machines	23.1	22.1	32.9	na
Tool & Cutter Grinding Machines	10.5	13.2	17.1	na
Other Cutting Machines	194.3	202.1	325.8	na
TOTAL FORMING MACHINES	458.1	574.8	763.1	na
Presses	115.8	173.7	216.7	na
Bending Machines	32.5	47.6	63.8	na
Punching & Shearing Machines	47.0	63.4	111.0	na
Forging Machines	8.1	9.6	20.4	na
Folding Machines	29.2	43.4	44.4	na
Bolt, Screw, Nut Making Machines	18.6	23.0	31.4	na
Wire Forming Machines	28.4	48.5	49.9	na
Other Forming Machines	176.5	165.7	225.6	na

Source: Unione Costruttori Italiani Macchine Utensili

ITALIAN EXPORTS OF MACHINE TOOLS
By Destination, 1985 to 1989
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL EXPORTS	$707.4	$969.7	$1,048.5	$1,309.4	$1,472.7
France	64.6	118.7	136.3	161.0	193.0
West Germany	103.1	139.8	157.0	155.3	181.8
Soviet Union	42.4	73.1	77.2	126.8	114.9
United States	94.1	129.5	85.9	107.5	101.0
Sweden	12.5	19.1	27.1	31.9	74.2
Spain	10.5	20.1	53.2	72.2	70.0
United Kingdom	31.3	42.7	38.3	54.6	60.2
Switzerland	21.8	41.6	53.2	46.3	62.3
East Germany	4.9	1.2	10.1	37.3	52.2
China	26.4	47.7	28.5	28.6	43.8
Belgium–Luxembourg	13.4	21.8	19.1	26.8	32.6
Yugoslavia	6.1	13.6	13.8	11.3	23.1
Algeria	15.5	16.8	16.3	9.7	20.6
Portugal	4.2	9.4	9.4	17.3	20.6
Turkey	35.4	14.3	19.7	25.2	19.3
Japan	6.7	(a)	7.6	11.9	17.0
Austria	9.5	18.5	19.7	19.5	16.4
Bulgaria	8.5	10.2	5.6	9.1	(a)
Greece	7.4	10.5	9.2	12.1	(a)
Netherlands	10.4	15.1	16.7	15.7	(a)
Poland	10.4	10.5	9.9	12.1	(a)
Egypt	7.6	9.5	4.8	4.8	(a)
Canada	24.3	28.6	16.2	22.6	(a)
Other Countries	136.4	157.4	213.7	289.8	369.7

(a) = Included in "Other Countries" Source: Unione Costruttori Italiani Macchine Utensili. Individual items may not add to totals due to rounding.

FRENCH PRODUCTION OF METAL CUTTING MACHINE TOOLS

By Type of Machine, Units and Value, 1986 to 1989

(millions of U.S. dollars)

	UNITS				VALUE			
	1986	1987	1988	1989	1986	1987	1988	1989
continued								
Grinding Machines, NC	13	7	(a)	(a)	2.7	1.1	(a)	(a)
Grinding Machines, non–NC	462	421	179	455	16.8	10.4	5.8	11.1
Tool or Cutter Grinding Machines	3,127	3,067	3,461	2,815	4.3	3.0	3.3	3.2
Threading & Tapping Machines	219	(a)	(a)	(a)	0.4	(a)	(a)	(a)
Planing Machines, non–NC	—	—	—	—	—	—	—	—
Slotting & Shaping Machines	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Surfacing Machines, non–NC	8,775	5,921	6,114	5,823	2.6	2.4	3.4	3.1
Surfacing Machines, NC	—	—	(a)	—	—	—	(a)	—
Polishing, Honing & Lapping Machines	211	323	300	382	3.2	3.9	1.9	2.0
Broaching Machines	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Gear Cutting Machines	—	—	—	—	—	—	—	—
Sawing & Cut–Off Machines, non–NC	738	777	852	912	3.3	3.6	4.5	2.7
Sawing & Cut–Off Machines, NC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Band Sawing Machines, non–NC	330	384	458	712	2.8	4.1	3.9	5.6
Band Sawing Machines, NC	(a)	(a)	—	—	(a)	(a)	—	—
Other Sawing or Cut–Off Machines, non–NC	(a)	593	542	172	(a)	2.5	2.3	2.5
Electro–Erosion Machines, NC	23	19	7	(a)	3.0	5.6	1.6	(a)
Electro–Erosion Machines, non–NC	310	230	118	(a)	5.0	5.4	4.1	(a)
Transfer Lines, non–NC	122	97	105	} 429	12.8	12.2	13.9	} 17.1
Unit Heads, non–NC	586	292	310		2.6	1.0	2.2	
Unit Heads & Transfer Lines, NC	35	66	60	115	53.4	99.0	118.9	125.5
Other Metal Cutting Machines, NC	220	786	1,164	na	43.4	96.0	93.8	55.5
Other Metal Cutting Machines, non–NC	9,801	8,958	9,100	na	35.5	78.3	61.3	90.3

[1] Total metal cutting machines includes data withheld in the table. (a) – data withheld to avoid disclosure of individual companies' data. (b) – does not include "Other Milling Machines, NC." (c) – "Vertical Boring & Turning Mills, NC" are included in "Other Lathes, NC." (d) – does not include "Vertical Turning Centers, NC." (e) – includes "Other Milling Machines" (f)– included in "Bed Type Milling Machines" Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associes.

FRENCH PRODUCTION OF METAL FORMING MACHINE TOOLS

By Type of Machine, Units and Value, 1986 to 1989

(millions of U.S. dollars)

	UNITS				VALUE			
	1986	1987	1988	1989	1986	1987	1988	1989
TOTAL METAL FORMING MACHINES	6,101	5,696	6,366	na	$116.8	$141.2	$187.9	$216.5
Total Metal Forming Machines, NC	732	661	1,070	na	37.3	45.4	68.2	93.2
Total Metal Forming Machines, non–NC	5,369	5,035	5,296	na	79.5	95.8	119.7	123.3
Sheet Metal Bending Machines, non–NC	176	60	26	40	2.0	1.7	1.4	1.7
Sheet Metal Bending Machines, NC	(a)	—	—	(a)	(a)	—	—	(a)
Sheet Metal Folding Machines, non–NC	1,065	722	(a)	(a)	2.6	1.4	(a)	(a)
Sheet Metal Folding Machines, NC	(a)	—	(a)	(a)	(a)	—	(a)	(a)
Sheet Metal Straightening Machines, non–NC	238	(a)	(a)	(a)	2.1	(a)	(a)	(a)
Sheet Metal Straightening Machines, NC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Bar & Tube Drawing Machines, non–NC	—	(a)	(a)	(a)	–	(a)	(a)	(a)
Straightening Machines, non–NC	—	—	(a)	(a)	–	–	(a)	(a)
Straightening Machines, NC	—	—	—	(a)	—	—	—	(a)
Profiling, Flanging & Molding Mach., non–NC	80	70	83	54	2.5	2.7	3.4	2.5
Other Bending Machines, non–NC	149	130	(a)	61	0.6	0.5	(a)	0.4
Other Bending Machines, NC	40	(a)	—	(a)	3.5	(a)	—	(a)
Punch., Shear, & Comb. Punch. & Shear., NC	(a)	12	242	188	(a)	0.6	3.0	5.6
Mechanical Shearing Machines, non–NC	84	11	68	(a)	0.9	0.3	0.7	(a)
Mechanical Shearing Machines, NC	(a)	—	(a)	(a)	(a)	—	(a)	(a)
Hydraulic Shearing Machines, non–NC	(a)	578	887	802	(a)	12.0	18.5	13.2
Other Shearing Machines, non–NC	1,040	941	992	(a)	8.5	8.2	9.2	(a)

continued

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FRENCH PRODUCTION OF METAL FORMING MACHINE TOOLS

By Type of Machine, Units and Value, 1986 to 1989

(millions of U.S. dollars)

	UNITS				VALUE			
	1986	1987	1988	1989	1986	1987	1988	1989
continued								
Punching Machines, non–NC	104	(a)	42	(a)	1.1	(a)	0.4	(a)
Comb. Punching & Shearing Mach., non–NC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Wireworking Machines, non–NC	64	80	55	52	3.0	7.5	5.3	5.8
Wireworking Machines, NC	10	14	(a)	(a)	1.0	1.5	(a)	(a)
Presses, NC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Open Front Mechanical Presses, non–NC	417	348	432	457	6.0	3.1	2.1	1.7
Forging, Stamp. & Percussion Presses, non–NC	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Forging, Stamp. & Percussion Presses, NC	—	—	—	—	—	—	—	—
Presses, Pneumatic	265	314	320	389	1.0	1.4	1.8	1.4
Mechanical Press Brakes, non–NC	—	—	(a)	—	—	—	(a)	—
Hydraulic Press Brakes, non–NC	376	144	383	220	8.9	4.6	8.1	4.8
Hydraulic Press Brakes, NC	—	177	495	447	—	8.8	27.3	20.8
Drop & Air Hammers, non–NC	—	—	—	—	—	—	—	—
Open Front Hydraulic Presses, non–NC	156	155	122	187(b)	3.1	5.8	4.1	4.7(b)
Other Hydraulic Presses, non–NC	170	108	70	154	7.4	5.2	4.7	6.5
Other Metal Forming Machines, NC	732	472	333	na	37.3	36.0	38.0	19.7
Other Metal Forming Machines, non–NC	985	1,722	1,816	na	27.2	41.5	59.9	48.6

[1] *Total metal forming includes data withheld in the table. (a) – data withheld b = does not include automatic open front hydraulic presses, for which data are withheld. Source: Syndicat de la Machine Outil, de l'Assemblage et de la Productique associes.*

ITALIAN EXPORTS OF MACHINE TOOLS

By Type of Machine, 1985 to 1989

(millions of U.S. dollars)

Machine Classifications	1985	1986	1987	1988	1989
TOTAL	$707.4	$969.7	$1,048.5	$1,309.4	$1,472.7
Lathes	75.3	77.1	95.4	130.1	136.9
Machining Centers	(a)	(a)	(a)	15.4	55.8
Transfer Machines	(a)	(a)	(a)	83.5	128.4
Boring Machines	34.0	44.0	36.1	53.2	57.7
Milling Machines	92.5	148.0	126.5	115.3	103.9
Drilling Machines	28.0	32.3	35.9	66.7	57.8
Broaching Machines	6.4	3.4	6.7	6.5	9.2
Grinding Machines	58.4	86.4	100.8	119.6	127.9
Gear Cutting Machines	2.2	6.5	8.5	15.6	22.7
Shaping & Slotting Machines	(a)	(a)	1.8	1.7	(a)
Sawing & Cut–Off Machines	26.1	37.2	46.1	51.7	67.4
Presses	62.0	101.0	123.6	146.0	168.7
Punching & Shearing Machines	25.7	44.7	35.2	51.7	75.7
Bending Machines	29.2	39.0	47.7	6.4	(a)
Forging Machines	10.3	13.0	9.4	26.1	(a)
All Other Machine Tools	257.2	337.0	374.8	419.9	387.3

(a) – Included in "All Others" Note: Individual items may not add to totals due to rounding. Source: Unione Costruttori Italiani Macchine Utensili.

ITALIAN IMPORTS OF MACHINE TOOLS

By Country of Origin, 1985 to 1989

(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL IMPORTS	$196.4	$346.8	$566.5	$706.1	$794.6
West Germany	76.7	127.4	214.8	255.6	309.4
Switzerland	39.9	72.7	103.8	111.8	102.8
Japan	11.6	28.2	54.5	84.3	101.9
France	8.4	16.1	20.9	41.6	43.5
United Kingdom	7.7	18.4	29.1	38.8	36.7
Taiwan	1.0	2.7	10.5	21.1	34.8
United States	12.4	12.7	20.5	21.8	30.9
Belgium–Luxembourg	3.9	13.9	17.9	20.9	21.5
Spain	3.4	6.0	14.8	17.4	19.3
East Germany	3.8	7.5	10.6	13.7	16.7
Austria	0.9	6.5	18.1	9.2	11.7
Soviet Union	5.6	6.4	8.2	8.9	10.4
Czechoslovakia	2.2	5.1	8.5	15.2	7.8
Netherlands	4.2	2.7	5.4	7.7	7.0
Sweden	9.8	9.1	9.2	9.1	6.6
Other Countries	5.0	11.3	19.7	29.0	33.6

Source: Unione Costruttori Italiani Macchine Utensili.

ITALIAN IMPORTS OF MACHINE TOOLS

By Type of Machine, 1985 to 1989

(millions of U.S. dollars)

Machine Classifications	1985	1986	1987	1988	1989
TOTAL IMPORTS	$196.4	$346.8	$566.5	$706.1	$794.6
Lathes	34.7	73.5	118.9	133.0	166.5
Machining Centers	(a)	(a)	(a)	64.8	88.2
Transfer Machines	(a)	(a)	(a)	13.3	16.4
Boring Machines	8.0	9.4	17.9	19.7	19.8
Milling Machines	19.2	38.2	70.5	67.9	84.0
Drilling Machines	5.3	16.2	22.3	15.7	14.9
Broaching Machines	(a)	(a)	0.3	0.6	0.3
Grinding Machines	24.8	29.2	51.2	52.4	42.5
Gear Cutting Machines	3.7	7.7	16.5	16.8	21.4
Shaping & Slotting Machines	(a)	(a)	2.3	0.6	(a)
Sawing & Cut–Off Machines	7.8	12.9	14.9	12.9	12.9
Presses	11.1	23.3	29.3	45.7	73.5
Punching & Shearing Machines	9.5	13.3	30.2	45.1	48.7
Bending Machines	6.3	8.6	14.0	2.4	(a)
Forging Machines	0.9	1.4	6.2	15.7	(a)
All Other Machine Tools	65.2	113.5	172.0	199.5	205.2

(a) – Included in "All Other Machine Tools" Source: Unione Costruttori Italiani Macchine Utensili. Individual items may not add to totals due to rounding

NETHERLANDS SALES OF MACHINE TOOLS AND PARTS

By Type of Machine, 1984 to 1988

(millions of U.S. dollars)

	1984	1985	1986	1987	1988(p)
GRAND TOTAL	$34.4	$50.8	$73.8	$56.5	$86.3
Metal Cutting Machine Tools	17.8	28.8	45.1	30.9	33.2
Metal Forming Machine Tools	12.2	13.9	18.8	16.3	33.2
Presses	1.9	2.0	2.5	4.5	na
Bending, Forming, & Straight.	4.5	4.3	5.3	2.5	7.2
Other Metal Forming	5.9	7.6	10.9	9.2	26.0
Machine Tool Parts & Accessories	4.3	8.1	9.9	9.3	19.9

Source: Vereniging Van Metaal–Industrieen.

NETHERLANDS IMPORTS AND EXPORTS OF MACHINE TOOLS AND PARTS

By Type of Machine, 1986 to 1988

(millions of U.S. dollars)

	Imports			Exports		
	1986	1987	1988	1986	1987	1988
TOTAL	$326.7	$321.1	$389.0	$162.2	$172.7	$281.9
Lathes	38.2	43.0	39.2	7.3	9.9	13.0
Milling Machines	60.9	60.0	48.7	27.2	23.4	13.4
Grinding, Honing & Polishing	22.2	42.5	26.1	28.7	24.7	27.1
Hydraulic Presses	11.1	2.4	7.1	7.8	1.1	4.3
Mechanical Presses	6.0	17.5	11.1	3.1	10.6	5.7
Bending, Forming, Straightening, Cutting and Edging Machines	42.3	39.4	53.0	30.5	37.5	47.2
Other Metalworking Mach. Tools	44.5	31.0	61.9	9.3	11.1	36.5
Parts and Accessories	101.6	85.3	142.0	48.2	54.4	134.7

Source: Vereniging Van Metaal–Industrieen. Individual items may not add to totals due to rounding.

The classifications of machine tools in the official Dutch Statistics have changed. As a result, the 1988 foreign trade and production numbers do not correspond directly to the figures from previous years.

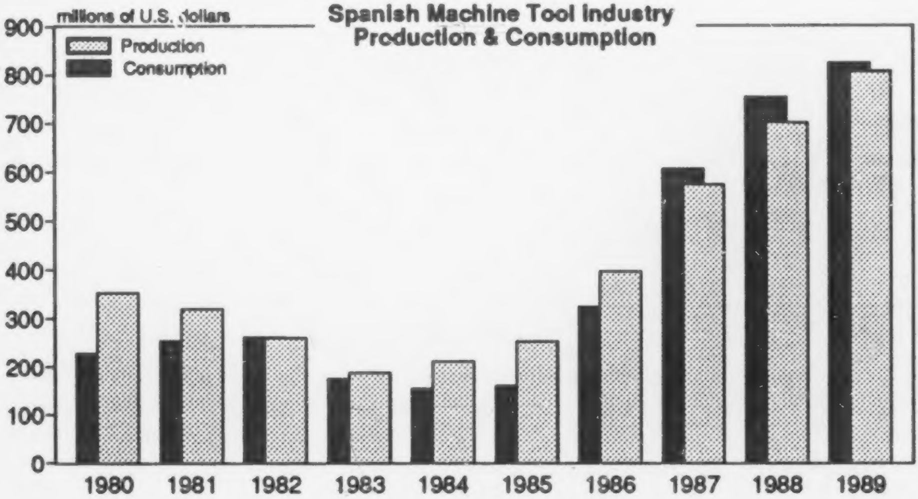
THE SPANISH MACHINE TOOL INDUSTRY

1975 to 1989

(millions of U.S. dollars)

Year	Production	Imports	Exports	Consumption	% Import Penetration	Exports as % of Prod.	Employees
1975	$223.1	$168.7	$86.5	$305.3	55.3%	38.8%	11,600
1976	183.6	132.7	90.8	225.5	58.8	49.5	11,000
1977	190.9	91.4	102.5	179.7	50.9	53.7	10,500
1978	232.2	90.1	147.6	176.8	51.0	63.6	10,300
1979	315.8	91.3	210.8	196.4	46.5	66.8	10,000
1980	352.8	103.2	228.3	227.8	45.3	64.7	9,500
1981	320.0	142.0	207.0	255.0	55.7	64.7	8,800
1982	260.2	176.7	175.5	261.4	67.6	67.4	8,500
1983	188.2	86.2	99.4	175.1	49.2	52.8	7,600
1984	211.5	56.1	113.3	154.4	36.3	53.6	7,300
1985	252.9	58.9	151.5	160.3	36.7	59.9	7,300
1986	396.3	105.8	178.7	323.4	32.7	45.1	7,600
1987	575.0	250.7	218.8	606.8	41.3	38.1	7,700
1988	702.2	311.6	260.2	753.6	41.3	37.1	7,800
1989	806.7	341.6	323.7	824.6	41.4	40.1	7,800

Source: Asociacion Espanola de Fabricantes de Maquinas–Herramienta.



SPANISH MACHINE TOOL PRODUCTION
By Type of Machine, 1986–1988
(millions of U.S. dollars)

	1986	1987	1988
Total Machine Tools	$396.6	$575.0	$702.2
Total NC Machine Tools	158.5	214.9	283.5
Total Non–NC Machine Tools	238.1	360.1	418.7
Total Metal Cutting	307.6	437.7	527.0
Total NC Cutting Machines	151.4	205.2	255.4
Total Non–NC Cutting Machines	156.2	232.5	271.5
Lathes	70.6	88.3	103.3
NC Lathes	38.3	42.5	54.1
Non–NC Lathes	32.4	45.8	49.2
Milling Machines	103.0	140.1	148.9
NC Milling Machines	55.0	80.0	90.1
Non–NC Milling Machines	48.0	60.1	58.8
Grinding Machines	25.1	36.8	44.7
NC Grinding Machines	8.3	11.9	13.3
Non–NC Grinding Machines	16.8	24.9	31.3
Boring Machines	12.9	11.3	11.1
NC Boring Machines	8.7	7.1	8.4
Non–NC Boring Machines	4.2	4.2	2.7
Drilling Machines	12.9	14.2	17.8
NC Drilling Machines	0.2	0.0	0.5
Non–NC Drilling Machines	12.7	14.2	17.3
Sawing & Cutting Machines	5.5	5.3	13.1
NC Sawing & Cutting Machines	0.0	0.1	0.0
Non–NC Sawing & Cutting	5.5	5.2	13.1
Transfer & Special Purpose Machines	26.4	46.4	50.4
NC Transfer & Special Purpose	na	12.8	10.7
Non–NC Transfer & Special Purpose	na	33.6	39.7
Machining Centers	19.7	35.0	47.9
Horizontal	13.3	21.7	na
Vertical	6.4	13.3	na
Other Metal Cutting Machines	31.5	60.3	89.8
NC Other Cutting Machines	na	15.8	30.3
Non–NC Other Cutting Machines	na	44.4	59.5
Total Metal Forming Machines	88.7	137.3	175.3
Total NC Forming Machines	7.1	9.7	28.1
Total Non–NC Forming Machines	81.5	127.6	147.2
Mechanical Presses	19.7	25.9	38.9
NC Mechanical Presses	0.0	0.0	1.8
Non–NC Mechanical Presses	19.7	25.9	37.1
Hydraulic Presses	9.0	17.1	23.9
NC Hydraulic Presses	0.0	0.6	0.0
Non–NC Hydraulic Presses	9.0	16.6	23.9
Guillotine Shears	6.4	9.0	12.8
NC Guillotine Shears	na	0.4	5.8
Non–NC Guillotine Shears	na	8.6	7.0
Press Brakes	8.3	12.6	17.0
NC Press Brakes	na	2.5	11.4
Non–NC Press Brakes	na	10.1	5.5
Other Metal Forming Machines	45.2	72.7	82.7
NC Other Forming Machines	na	6.2	9.0
Non–NC Other Forming Machines	na	66.5	73.6

Source: Asociacion Espanola de Fabricantes de Maquinas–Herramienta

©NMTBA p – preliminary, r – revised, na – not available, D – not disclosed
E – estimated from fragmented data, N.E.C. – not elsewhere classified

SPANISH IMPORTS AND EXPORTS OF MACHINE TOOLS

By Type of Machine, 1986 to 1989

(millions of U.S. dollars)

	UNITS				VALUES			
Type of Machine	1986	1987	1988	1989	1986	1987	1988	1989
TOTAL IMPORTS	29,855	226,291	184,904	141,829	$105.8	$250.7	$311.6	$341.6
Metal Cutting Total	23,521	140,412	88,358	109,771	61.3	158.3	184.2	168.3
Lathes	644	1,066	1,866	1,976	14.8	25.8	41.6	47.1
Boring Machines	87	65	105	60	1.0	11.7	3.4	1.4
Milling Machines	246	670	1,875	1,267	3.1	6.1	14.1	11.4
Drilling Machines	2,483	31,413	11,065	11,458	2.7	24.4	5.1	8.6
Grinding & Polishing	16,096	42,717	27,391	31,463	13.7	35.3	34.6	30.4
Machining Centers	(a)	145	232	313	11.8	17.7	36.8	29.0
Other Metal Cutting	3,965	64,336	45,824	63,234	14.1	37.4	48.5	40.4
Metal Forming Total	6,334	85,879	96,546	32,058	44.5	92.4	127.4	172.2
Presses	363	671	2,280	6,350	9.1	24.1	20.8	38.1
Forging & Stamping	33	5,196	423	317	7.5	14.8	21.6	31.1
Other Metal Forming	5,938	80,012	93,843	25,391	28.0	53.5	85.0	107.0
TOTAL EXPORTS	31,276	84,786	347,664	104,935	178.7	218.8	260.2	323.7
Metal Cutting Total	12,279	55,371	55,068	39,230	142.5	172.2	194.3	252.1
Lathes	1,600	1,708	1,505	1,603	25.0	28.9	37.0	36.6
Boring Machines	85	105	126	102	9.1	7.2	6.9	4.4
Milling Machines	5,270	44,578	7,039	6,897	65.7	81.2	85.6	111.1
Drilling Machines	1,763	1,421	5,088	1,562	7.4	6.8	6.9	8.8
Grinding & Polishing	841	3,868	25,171	3,168	14.2	19.4	23.5	25.1
Machining Centers	(b)	67	153	123	6.0	10.1	13.5	19.9
Other Metal Cutting	2,720	3,624	16,006	28,775	15.1	18.6	20.9	46.2
Metal Forming Total	18,997	29,415	292,576	65,705	36.2	46.7	65.9	71.6
Presses	840	812	55,337	4,725	13.5	18.6	14.0	21.3
Forging & Stamping	29	44	45	109	1.0	0.7	2.5	2.4
Other Metal Forming	18,128	28,559	237,194	60,871	21.7	27.3	49.4	47.9

(a) – Included in "Other Metal Cutting" Imports. (b) Included in "Other Metal Cutting" Exports. Source: Asociacion Espanola de Fabricantes de Maquinas–Herramienta

SPANISH IMPORTS AND EXPORTS OF MACHINE TOOLS
By Country of Origin and Destination, 1985–1989

Imports
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL IMPORTS	$58.9	$105.8	$250.7	$311.6	$341.6
Belgium--Luxembourg	0.9	1.3	6.4	4.2	7.0
East Germany	2.3	(a)	7.1	3.3	15.1
France	5.6	6.1	28.0	13.8	18.6
Italy	9.1	19.1	44.8	69.4	68.3
Japan	5.9	15.7	25.1	48.8	37.7
Netherlands	0.1	0.4	2.1	3.2	2.2
Portugal	0.2	0.5	2.6	3.4	3.2
Sweden	2.1	0.9	0.9	2.8	3.1
Switzerland	4.5	8.9	17.6	18.1	20.2
Taiwan	(a)	(a)	1.9	4.6	8.8
United Kingdom	4.8	6.8	35.8	24.0	21.3
United States	4.2	5.1	7.4	24.6	11.6
West Germany	17.5	34.1	58.0	73.3	105.6
Other Countries	1.7	6.9	12.9	24.5	18.9

Exports
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL EXPORTS	$113.3	$178.7	$218.8	$260.2	$323.7
Austria	(a)	(a)	3.4	3.4	3.8
Belgium–Luxembourg	1.8	4.0	4.0	4.7	4.9
Brazil	(a)	(a)	3.2	2.2	3.4
Canada	3.1	3.9	3.7	3.8	3.4
Cuba	1.9	4.2	7.6	11.0	9.9
Czechoslovakia	(a)	(a)	2.0	0.7	13.4
East Germany	(a)	(a)	0.1	7.5	8.6
Finland	1.5	3.6	2.8	4.5	5.5
France	8.2	17.4	22.9	30.5	40.1
India	2.8	1.6	4.1	2.6	4.8
Italy	2.4	6.6	11.2	13.1	17.6
Mexico	4.1	4.1	3.4	2.2	15.2
Netherlands	2.5	7.5	9.1	6.4	6.9
Portugal	3.2	7.3	12.9	25.2	18.9
Soviet Union	(a)	(a)	0.9	0.1	4.2
Sweden	3.1	5.6	7.5	9.1	7.9
Switzerland	1.6	3.1	4.1	4.6	3.4
United Kingdom	6.6	12.6	13.0	17.0	19.7
United States	16.0	20.6	17.1	22.2	25.7
Venezuela	3.9	3.4	4.3	11.1	6.1
West Germany	15.7	32.0	39.3	37.2	53.6
Other Countries	34.9	41.2	42.2	41.1	46.7

(a) – Included in "Other Countries" Source: Asociacion Espanola de Fabricantes de Maquinas–Herramienta

SWEDISH PRODUCTION OF MACHINE TOOLS
By Type of Machine, 1986 to 1988
(millions of U.S. dollars)

Machine Classification	1986	1987	1988
GRAND TOTAL	$299.1	$328.0	na
Total Metal Cutting	131.8	133.9	na
Drilling Machines	14.8	16.6	na
Gear Cutting Machines	—	—	na
Grinding and Polishing	57.8	60.9	na
Lathes	31.0	28.3	na
Milling Machines	26.9	36.1	na
Broaching Machines	—	—	na
Planers and Shapers	—	—	na
Other Metal Cutting Machines	1.3	1.1	na
Total Metal Forming	78.9	89.1	na
Hammers incl. Other Forging	1.1	1.3	na
Presses	20.7	23.6	na
Punching & Shearing Machines	10.3	11.5	na
Other Metal Forming Machines	47.2	52.7	na
Parts and Accessories	88.3	105.0	na

Source: The Swedish Machine Tool and Cutting Tool Manufacturers' Association.

SWEDISH IMPORTS AND EXPORTS OF MACHINE TOOLS
By Country, 1986 to 1989
(millions of U.S. dollars)

	IMPORTS FROM				EXPORTS TO			
Country	1986	1987	1988	1989	1986	1987	1988	1989
TOTAL	$229.3	$312.3	$340.5	$354.0	$164.6	$192.8	$213.7	$215.8
Austria	6.7	4.1	2.8	5.7	3.4	2.6	2.4	3.8
Belgium–Luxembourg	3.9	5.0	6.1	4.1	2.3	2.5	2.7	2.2
Brazil	(a)	(a)	0.2	0.1	(a)	(a)	0.2	4.5
Canada	0.2	0.3	0.1	0.1	3.1	3.6	3.8	11.1
China	0.2	0.5	0.2	0.4	7.6	2.6	4.3	0.9
Czechoslovakia	4.5	4.9	4.1	3.8	0.2	0.9	2.2	2.4
Denmark	6.9	8.3	11.3	10.3	13.1	8.7	13.3	13.2
East Germany	2.0	3.3	3.4	2.9	0.2	4.4	6.6	5.9
Finland	4.1	6.3	6.9	6.1	7.4	11.0	12.0	11.7
France	2.9	4.2	7.3	6.8	5.7	5.3	10.5	17.4
Italy	16.5	41.0	36.4	34.4	10.6	10.7	7.3	5.9
Japan	45.9	53.4	62.3	60.9	1.0	0.6	2.5	4.7
Netherlands	4.5	5.3	5.5	3.8	4.5	4.4	4.7	5.6
Norway	0.8	1.7	2.3	1.4	9.4	12.1	7.8	6.6
Poland	0.8	1.3	1.1	0.7	3.7	2.3	5.8	3.8
South Korea	(a)	(a)	1.0	0.7	(a)	(a)	2.9	5.3
Soviet Union	0.8	0.6	0.6	0.6	0.8	2.4	6.8	4.4
Spain	6.0	9.1	8.5	7.8	0.5	1.3	2.1	3.7
Switzerland	22.5	22.6	23.4	23.9	3.6	4.3	3.7	4.2
Taiwan	2.2	7.2	11.1	16.3	0.1	0.4	1.1	0.6
United Kingdom	9.3	17.4	11.2	11.5	21.2	20.8	24.3	25.9
United States	4.3	8.9	4.9	7.0	22.3	26.0	27.7	26.5
West Germany	82.5	103.1	127.7	142.2	26.7	39.6	35.5	30.4
All Others	1.8	3.8	2.1	2.5	17.2	26.3	23.5	15.1

(a) – included in "All Others" (b) less than $50,000 Source: The Swedish Machine Tool and Cutting Tool Manufacturers' Association. Individual items may not add to totals due to rounding.

SWEDISH IMPORTS AND EXPORTS OF MACHINE TOOLS

By Type of Machine, 1986–1989

(millions of U.S. dollars)

	IMPORTS				EXPORTS			
Machine Classification	1986	1987	1988	1989	1986	1987	1988	1989
MACHINE TOOL TOTAL	$229.3	$312.3	$340.5	$354.0	$164.6	$192.8	$213.7	$215.8
TOTAL CUTTING	173.4	222.8	249.0	271.3	99.6	120.6	121.4	134.1
Physico–Chemical Mach.	9.3	7.8	1.5	0.6	0.2	0.6	—	—
Machining Centers	(b)	(b)	70.8	74.8	(b)	(b)	8.2	9.4
Lathes	46.9	56.1	64.9	75.1	28.8	21.9	19.2	22.9
Automatic, NC	26.8	30.6	36.4	55.4	0.4	0.8	14.5	16.2
Automatic, Non–NC	5.2	4.3	13.4	9.1	2.5	2.1	3.5	4.8
Other, NC	7.7	12.0	11.7	8.4	22.3	16.3	0.2	1.1
Other, Non–NC	7.2	9.2	3.4	2.2	3.6	2.7	0.9	0.8
Drilling & Boring	6.0	10.2	9.2	10.8	12.8	10.8	10.8	12.2
NC	3.6	6.3	5.2	7.8	2.4	1.4	1.3	1.9
Non–NC	2.4	3.9	4.0	3.0	10.4	9.4	9.4	10.3
Milling & Boring Mach.	36.1	37.5	33.6	29.2	11.9	19.1	8.6	6.5
NC	24.7	28.1	27.5	20.9	6.5	14.2	3.9	2.9
Non–NC	11.4	9.4	6.1	8.3	5.4	4.9	4.7	3.6
Threading & Tapping	0.7	1.6	1.3	0.5	1.1	1.1	2.1	1.6
Grinding, Polishing	25.5	32.9	34.5	45.2	43.2	65.7	63.5	74.8
NC	na	na	15.0	27.9	na	na	49.0	57.8
Non–NC	na	na	19.6	17.3	na	na	14.6	17.0
Planers & Shapers	0.5	0.5	1.0	0.4	0.1	(a)	0.9	0.2
Sawing & Cut–off	7.6	8.7	11.3	13.3	1.1	0.7	2.2	0.9
Broaching	1.0	0.9	1.2	0.1	(a)	(a)	0.2	(a)
Gear Cutting	0.8	6.8	2.5	4.6	0.2	0.5	0.1	1.3
Other Metal Cutting	39.0	59.9	17.2	16.8	0.2	0.1	5.6	4.3
TOTAL FORMING	55.8	89.5	91.5	82.7	65.0	72.2	92.3	81.7
Hammers & Other Forging	0.6	1.3	2.2	3.0	0.5	1.3	6.4	0.8
Punching & Shearing	23.4	27.1	33.5	33.3	16.3	22.5	29.9	22.7
Bend, Fold, Straighten	13.1	21.2	23.0	18.2	10.1	9.2	11.4	20.6
Hydraulic Presses	5.6	11.4	11.9	11.4	23.1	18.9	30.8	14.6
Other Presses	3.2	11.5	(c)	(c)	1.2	0.6	(c)	(c)
Other Metal Forming	9.9	17.0	20.9	16.9	13.7	19.7	13.8	23.1
Parts & Accessories	59.5	75.0	76.9	90.2	73.7	83.1	95.8	109.0

(a) – less than $50,000 (b) – included in "Other Cutting" (c) – included in "Other Forming" Source: The Swedish Machine Tool and Cutting Tool Manufacturers' Association

SWITZERLAND MACHINE TOOL IMPORTS
By Country of Origin, 1985–1989
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL IMPORTS	$170.0	$313.2	$360.1	$383.2	$426.6
Austria	3.9	5.6	5.7	8.3	9.0
Belgium–Luxembourg	1.2	3.2	2.2	2.2	4.6
Czechoslovakia	1.0	2.0	2.4	2.0	2.5
Denmark	0.9	1.6	2.3	2.1	3.3
East Germany	0.2	0.4	0.5	1.3	0.9
France	8.7	17.6	18.7	25.3	25.6
Italy	20.4	35.0	47.5	42.0	53.8
Japan	27.5	48.7	48.6	61.4	77.0
Netherlands	1.1	3.9	3.8	4.4	4.9
Soviet Union	0.6	1.5	2.3	1.6	2.8
Spain	2.0	2.9	4.2	4.2	3.2
Sweden	2.1	3.7	3.7	3.9	3.6
Taiwan	0.5	3.9	7.8	4.1	5.6
United Kingdom	5.4	7.0	7.5	13.3	13.1
United States	5.3	5.3	3.8	5.9	8.1
West Germany	88.0	168.1	193.7	195.5	203.6
All Others Countries	1.2	2.8	5.4	5.4	4.9

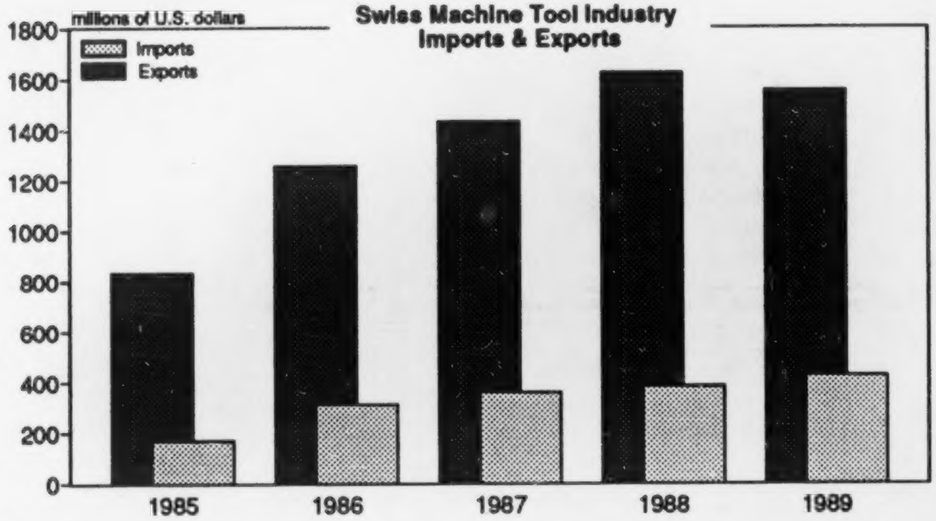
Source: The Swiss Association of Machinery Manufacturers

SWITZERLAND MACHINE TOOL EXPORTS
By Destination, 1985–1989
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL EXPORTS	$836.3	$1,259.9	$1,435.8	$1,625.7	$1,556.6
Austria	15.0	21.2	27.7	31.3	29.4
Belgium–Luxembourg	7.6	13.8	16.5	18.6	22.6
Brazil	3.4	9.9	10.7	17.9	21.5
Bulgaria	19.4	42.4	44.4	16.1	24.6
Canada	9.0	14.1	13.6	10.1	7.5
China	26.3	51.8	35.1	45.1	30.8
Czechoslovakia	17.7	24.5	27.6	30.1	24.8
Denmark	7.2	10.7	14.2	9.4	11.7
East Germany	3.3	12.5	48.9	91.0	53.4
France	49.8	94.5	113.1	133.2	147.9
India	13.6	19.5	27.2	24.5	16.8
Iran	3.5	9.2	27.5	29.3	23.0
Iraq	2.4	1.8	9.1	22.3	23.9
Italy	45.7	73.0	103.8	128.7	111.8
Japan	62.7	54.0	47.3	66.6	84.4
Mexico	6.7	5.4	4.9	4.7	6.3
Netherlands	13.2	19.8	20.3	26.7	20.0
Poland	10.0	12.6	18.2	23.9	25.2
Singapore	3.5	2.9	6.5	9.7	8.6
South Korea	8.8	13.6	21.1	22.4	32.1
Soviet Union	61.3	84.9	108.2	169.0	138.2
Spain	6.3	11.8	19.0	20.3	21.9
Sweden	13.9	26.4	22.5	21.6	24.9
Taiwan	4.6	5.6	12.5	15.3	14.5
Thailand	9.0	2.5	4.8	13.2	7.3
United Kingdom	39.0	48.8	36.7	53.2	49.5
United States	123.5	134.4	119.2	112.6	117.6
West Germany	187.7	342.8	394.3	356.2	379.4
Yugoslavia	4.0	15.8	14.4	16.8	13.1
All Other Countries	58.2	79.7	66.5	85.8	64.0

Source: The Swiss Association of Machinery Manufacturers

SWITZERLAND MACHINE TOOL IMPORTS AND EXPORTS



SWITZERLAND MACHINE TOOL IMPORTS AND EXPORTS

By Type of Machine, 1988–1989

(millions of U.S. dollars)

	Imports		Exports	
	1988	1989	1988	1989
TOTAL MACHINE TOOLS	$1,625.8	$1,556.7	$383.2	$426.6
Machining Centers	126.7	116.1	61.4	81.1
Lathes	206.7	179.4	89.1	106.9
Drilling & Milling Machines	235.2	192.1	61.9	67.7
Grinding Machines	321.2	333.1	40.5	40.8
Other Metal Cutting Machines	99.4	104.2	23.3	22.9
Presses	208.1	239.8	75.6	80.0
Other Metal Forming Machines	109.5	72.4	12.6	15.0
Physico–Chemical Process	318.8	319.6	18.9	12.1

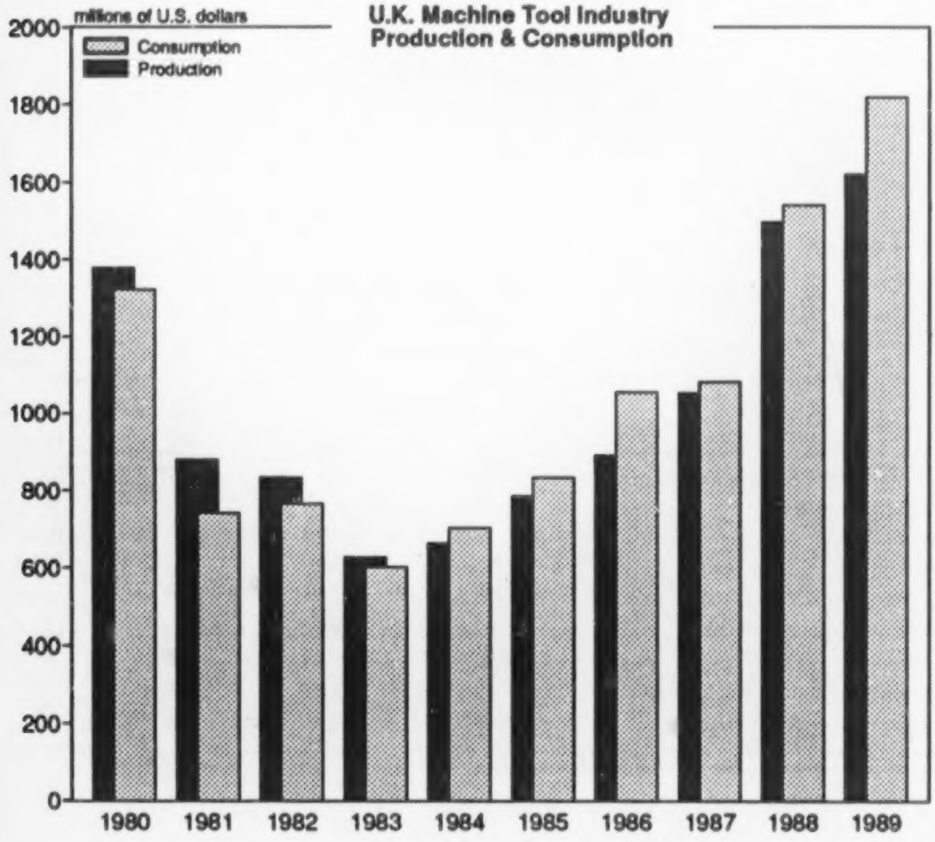
Source: The Swiss Association of Machinery Manufacturers

THE UNITED KINGDOM MACHINE TOOL INDUSTRY 1980–1989

(millions of U.S. dollars)

	Production[1]	Exports	Imports	Consumption	% Import Penetration	Exports as % of Prod.
1980	$1,379.5	$680.0	$624.4	$1,323.9	47.2%	49.3%
1981	880.1	570.6	432.6	742.1	58.3	64.8
1982	835.0	478.1	409.3	766.2	53.4	57.3
1983	628.0	319.1	294.1	603.0	48.8	50.8
1984	664.1	302.4	342.4	704.1	48.6	45.5
1985	785.6	344.7	394.3	835.2	47.2	43.9
1986	891.9	394.9	559.4	1,056.4	53.0	43.6
1987	1,055.5	501.0	529.7	1,084.2	48.9	47.5
1988	1,499.9	695.1	738.0	1,542.8	47.8	46.3
1989(p)	1,623.3	662.4	851.5	1,812.2	47.0	40.8

[1] *Includes estimates of production by small firms. Source: The Machine Tool Technologies Association*



UNITED KINGDOM NET NEW ORDERS AND SHIPMENTS OF MACHINE TOOLS
1975 to 1989
(millions of U.S. dollars)

Year	Net New Orders			Shipments			Unfilled
	Total	Domestic	Foreign	Total	Domestic	Foreign	Orders
1975	$548.4	$321.5	$226.9	$723.0	$414.2	$308.8	$510.6
1976	570.8	346.8	224.0	635.8	377.5	258.3	350.4
1977	839.8	553.5	286.3	707.1	443.5	263.6	471.4
1978	1,046.4	689.3	357.1	960.0	599.0	361.0	604.8
1979	1,260.3	771.6	488.7	1,205.9	793.6	412.3	742.7
1980	1,038.8	562.3	476.5	1,370.6	813.9	556.7	418.7
1981	865.3	273.2	592.1	903.2	498.5	404.7	304.2
1982	576.8	327.0	249.8	763.6	414.0	349.6	157.5
1983	471.7	259.7	212.0	544.0	318.5	225.5	na
1984	535.5	284.3	251.2	519.6	303.3	216.3	na
1985	618.3	321.8	296.5	580.4	316.9	263.5	na
1986	730.6	341.8	388.8	735.4	409.6	325.8	na
1987	831.1	420.2	410.9	829.3	448.7	380.6	na
1988(r)	887.6	452.8	434.8	874.1	430.9	443.2	na
1989(p)	841.0	na	na	912.3	na	na	na

Source: The Machine Tool Technologies Association and the Department of Trade and Industry.

Note: Data only cover firms with at least 35 employees (50 before 1986). Net new orders and shipments beginning in 1986 are estimated from a larger sampling of firms and, consequently, are reflected in higher figures.

UNITED KINGDOM EMPLOYMENT IN THE MACHINE TOOL INDUSTRY
Number of Employees, 1968 to 1989

Year	Employees	Year	Employees	Year	Employees
1968	63,600	1976	47,050	1984	23,775
1969	63,700	1977	47,675	1985	23,800
1970	65,100	1978	48,500	1986	23,400
1971	59,000	1979	48,350	1987	23,200
1972	50,100	1980	46,350	1988	24,400
1973	48,400	1981	36,700	1989	23,700
1974	50,000	1982	29,825	—	—
1975	49,100	1983	25,925	—	—

Source: The Machine Tool Technologies Association and the Department of Employment

Note: Data from 1982 forward relate to Great Britain only.

UNITED KINGDOM SHIPMENTS NUMERICALLY CONTROLLED MACHINE TOOLS

By Type of Machine, Units and Value, 1985–1989

(millions of U.S. dollars)

	UNITS				VALUES			
	1986	1987	1988r	1989p	1986	1987	1988r	1989p
TOTAL NC MACHINE TOOLS	na	na	na	na	$254.1	$291.2	$481.5	$556.4
Machining Centers:								
Horizontal	158	131	179	260	33.3	44.9	52.0	74.0
Vertical	912	756	1,028	1,326	68.8	73.6	123.8	107.1
Other Multi–Function [1]	1,043	830	911	–	36.8	44.0	49.5	--
Lathes	895	na	666	1,501	51.2	30.2	48.3	143.3
Grinding Machines	(a)	(a)	(a)	197	(a)	(a)	(a)	65.6
Milling Machines	na	na	na	1,004	15.0(b)	28.5(b)	111.7(b)	57.6
Boring Machines	na	na	na	na	(c)	(c)	(c)	(a)
Drilling Machines	na	na	na	na	(c)	(c)	(c)	3.4
Other NC Machines	391	314	375	na	49.0	70.0	96.4	105.4

[1] multi–function (drilling and milling and boring) with line motion or contouring control system with manual tool change or indexing-turret. (a) – included in "Other NC Machines" (b) – includes Boring and Drilling Machines (c) – included in "Milling Machines" Individual items may not add to totals due to rounding.
Source: Department of Trade and Industry.

Note: Data only cover firms with at least 35 employees (50 before 1986).

UNITED KINGDOM ORDERS AND SHIPMENTS

Numerically Controlled Machine Tools

(millions of U.S. dollars)

	New Orders				Shipments			
	Total		Foreign		Total		Foreign	
Year	Units	Value	Units	Value	Units	Value	Units	Value
1975	283	28.8	70	8.6	739	52.7	271	20.9
1976	535	57.4	157	17.8	612	48.6	192	17.6
1977	614	78.5	155	22.4	724	58.3	na	17.3(a)
1978	681	106.0	209	26.1	969	102.4	245	29.1
1979	1,262	180.5	399	48.1	1,058	139.1	251	36.1
1980	978	160.7	397	60.2	1,240	199.0	421	54.7
1981	1,237	192.8	396	75.7	1,196	165.0	399	56.2
1982	1,370	124.6	na	35.3	1,510	173.7	424	74.7
1983	2,010	125.7	na	42.6	1,825	130.8	489	43.8
1984	na	152.7	na	64.1	na	157.6	815	51.0
1985	na	219.1	na	101.0	na	184.7	na	79.1
1986	na	308.5	na	170.3	na	254.1	na	122.6
1987	na	314.8	na	146.4	na	291.2	na	128.8
1988(r)	na	487.2	na	237.6	na	481.5	na	240.1
1989(p)	4,767	570.5	na	na	na	556.4	na	na

(a) – Does not include figures for Drilling, Boring or Milling Machines. Sources: The Machine Tool Technologies Association and the Department of Trade and Industry.

Note: Data only cover firms with at least 35 employees (50 before 1986).

UNITED KINGDOM SHIPMENTS OF NON–NC MACHINE TOOLS

By Type of Machine, 1986–1989

(millions of U.S. dollars)

	UNITS				VALUES			
	1986	1987	1988	1989(p)	1986	1987	1988	1989(p)
TOTAL NON–NC CUTTING	na	na	na	na	$209.6	$226.2	$278.6	$229.6
Grinding Machines	na	na	na	na	51.3	44.1	55.0	26.9
Cylindrical	280	208	na	na	20.8	16.1	17.8	na
Surface	na	513	512	na	10.9	11.8	15.5	na
Other Grinding	1,698	na	2,490	na	19.7	16.2	21.7	na
Boring Machines	91	93	na	na	7.0	3.4	(a)	(b)
Milling Machines	1,447	na	2,378	na	18.8	22.0	24.9	24.4
Lathes	6,688	na	na	5,275	59.6	56.9	80.3	73.0
Drilling Machines	638	710	582	na	3.8	3.8	6.9	11.8(c)
Unit Const. & Transfer	na	na	na	na	33.2	62.3	61.3	56.4
Sawing & Cut–Off	5,558	6,210	na	na	13.1	6.9	(a)	15.6
Physico–Chemical	na	na	na	na	9.4	15.6	19.4	17.5
Other Metal Cutting	na	na	na	na	13.5	11.3	24.8	3.9
TOTAL NON–NC FORMING	na	na	na	na	66.7	92.1	114.0	126.4
Bending & Forming	na	na	na	105	na	na	na	43.1
Bar, Tube and Section	458	279	67	na	13.6	18.0	16.6	na
Sheet Metal Working & Forming	(d)	64	(d)	na	(d)	2.8	(d)	na
Wire & Strip Drawing & Forming	144	228	na	na	3.5	12.0	8.9	na
Plate & Sheet Bending & Forming	(d)	(d)	(d)	na	(d)	(d)	(d)	na
Other Bending & Forming	(d)	(d)	(d)	na	(d)	(d)	(d)	na
Forging Machines	826	na	na	na	4.8	3.3	3.4	(d)
Presses	na	na	na	na	na	na	na	36.6
Mechanical :								
Open Front	155	na	na	na	4.3	(d)	(d)	na
Straight Sided	na	na	na	na	(d)	(d)	(d)	na
Other	na	na	na	na	(d)	(d)	(d)	na
Hydraulic :								
Open Front	273	na	na	na	7.0	5.7	9.4	na
Other	(d)	na	na	na	(d)	6.2	8.6	na
Punching & Shearing	(d)	na	na	na	(d)	(d)	15.0	25.9
Other Metal Forming	821	na	na	na	42.0	43.9	51.8	21.0
Parts For Machines:								
Metal Cutting	–	–	–	–	126.5	138.2	171.2	187.0
Metal Forming	–	–	–	–	32.4	36.2	38.5	45.6

(a) – Included in "Other Metal Cutting Machines" (b) – Included in "Drilling Machines" (c) – Includes "Boring Machines" (d) – Included in "Other Metal Forming Machines." Source: United Kingdom Department of Trade and Industry. Individual items may not add to totals due to rounding.

Note: Data only cover firms with at least 35 employees (50 before 1986).

UNITED KINGDOM IMPORTS OF MACHINE TOOLS

By Type of Machine, 1986–1989

(millions of U.S. dollars)

	UNITS				VALUES			
Type of machine	1986	1987	1988	1989	1986	1987	1988	1989
TOTAL MACHINE TOOLS	93,036	146,964	na	na	$559.4	$529.7	$738.0	$851.5
Electro-Physical Mach.	259	299	1,547	18,348	12.9	13.1	42.0	37.7
Lathes	3,815	3,827	na	na	119.7	119.0	148.9	161.5
NC	1,149	847	1,195	1,420	91.7	90.3	111.8	132.2
Non-NC	2,031	2,719	na	na	22.4	24.4	29.0	22.3
Used & Rebuilt	635	261	na	na	5.6	4.3	8.0	7.1
Plane, Shape, Slot, Broach	172	143	67	216	4.8	2.8	3.3	7.9
Sawing & Cut-off	9,272	11,756	20,369	12,998	17.9	16.9	27.1	23.9
Milling Machines	1,765	2,769	3,497	4,168	32.3	38.8	52.6	49.2
NC	213	278	300	285	17.8	22.0	26.5	19.0
Non-NC	1,415	2,262	3,124	3,777	12.5	13.6	24.4	28.7
Used & Rebuilt	137	229	73	106	2.1	3.3	1.6	1.5
Drilling Machines	17,210	21,875	9,175	4,812	17.8	16.1	15.5	15.9
NC	135	107	106	97	7.5	8.2	7.8	7.9
Non-NC	14,863	20,386	9,069	4,715	7.6	5.4	7.7	8.0
Used & Rebuilt	2,212	1,382	–	–	2.6	2.5	–	–
Boring Machines	560	420	915	711	33.2	34.4	20.5	27.2
NC	116	116	153	115	24.1	24.3	11.6	18.5
Non-NC	444	304	762	596	9.1	10.2	8.9	8.7
Grinding & Polishing	43,507	57,861	30,826	49,867	75.6	60.8	62.5	73.3
NC	871	1,474	565	341	19.4	24.1	25.8	39.0
Non-NC	42,636	56,387	30,261	49,526	56.1	36.8	36.7	34.3
Honing & Lapping	154	183	60	1,591	2.9	3.4	3.0	4.9
Gear Cutting Machines	66	34	2,299	661	6.9	5.4	16.4	14.3
NC	8	15	68	12	2.2	3.9	9.4	3.3
Non-NC	58	19	2,231	649	4.7	1.5	6.9	11.0
Threading & Tapping	1,286	1,423	1,119	1,546	4.0	4.3	6.4	5.9
Machining Centers	334	359	779	774	46.7	52.3	71.1	99.0
Horizontal	103	103	169	359	19.4	22.3	31.2	55.6
Other	231	256	610	415	27.3	30.0	39.9	[illegible]
Unit Const. & Transfer	197	99	99	408	76.4	29.2	20.9	[illegible]
Presses	1,354	2,319	4,134	7,159	20.4	33.7	62.4	57.9
Bend, Fold, Flatten	1,406	1,432	4,492	5,227	22.3	18.5	45.1	44.1
NC	53	82	222	408	5.9	4.8	13.7	15.7
Non-NC	1,353	1,350	4,270	4,819	16.4	13.8	31.4	28.4
Punching & Shearing	1,426	1,372	5,922	na	24.0	35.9	68.0	92.2
NC	113	152	232	235	12.9	22.9	31.2	30.5
Non-NC	1,313	1,220	5,690	na	11.1	12.9	36.9	61.7
Forging & Stamping	30	16	273	326	4.1	3.6	10.2	13.6
NC	9	8	11	5	3.1	2.5	2.7	1.0
Non-NC	21	8	262	321	1.0	1.1	7.5	12.6
Machines for Working Wire	279	242	447	999	6.3	4.3	7.7	12.3
Other Machine Tools	9,944	40,535	15,651	30,689	31.2	37.5	52.7	43.3

Source: Department of Trade and Industry. Individual items may not add to total due to rounding.

UNITED KINGDOM IMPORTS OF MACHINE TOOLS
By Country of Origin, 1985 to 1989
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL IMPORTS	$394.3	$559.4	$529.7	$738.0	$851.5
Japan	87.8	107.2	115.1	182.8	206.8
West Germany	108.9	164.5	182.2	185.6	187.9
United States	54.5	74.0	43.6	85.3	147.9
Italy	27.3	33.8	25.7	38.1	46.9
Taiwan	6.9	10.7	21.4	31.0	41.3
Switzerland	34.1	45.7	36.8	50.1	39.8
France	10.6	12.9	13.3	27.1	26.2
Sweden	11.0	18.6	16.6	25.3	21.2
Austria	(a)	4.8	10.7	9.8	19.8
Canada	(a)	29.7	(a)	1.0	18.0
Netherlands	6.6	6.2	(a)	15.3	15.6
Spain	9.4	12.7	12.0	15.1	11.8
Belgium	7.7	5.6	13.4	14.3	11.6
Ireland	2.6	(a)	(a)	4.1	5.7
Denmark	3.9	(a)	6.4	5.9	5.2
Other Countries	23.0	32.7	32.5	41.9	45.6

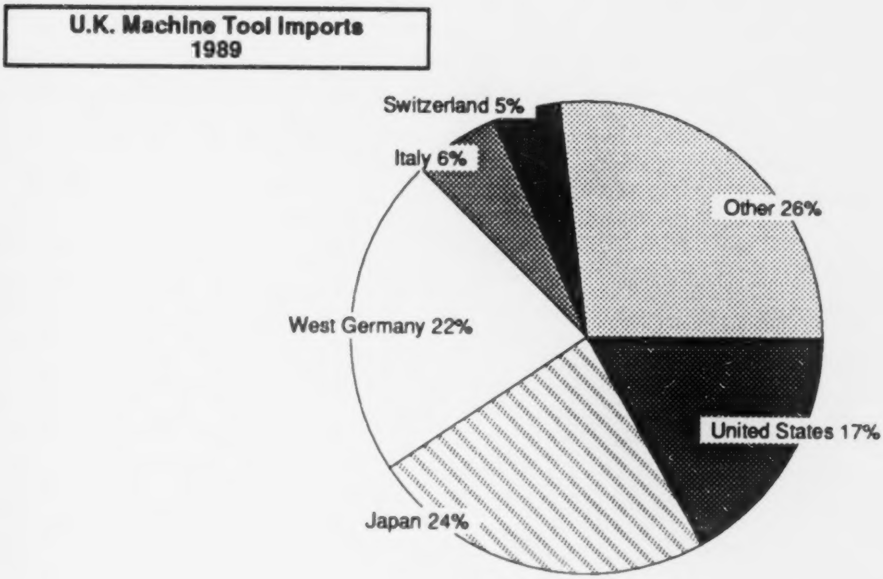
(a) – included in "Other Countries" Source: The Machine Tool Technologies Association

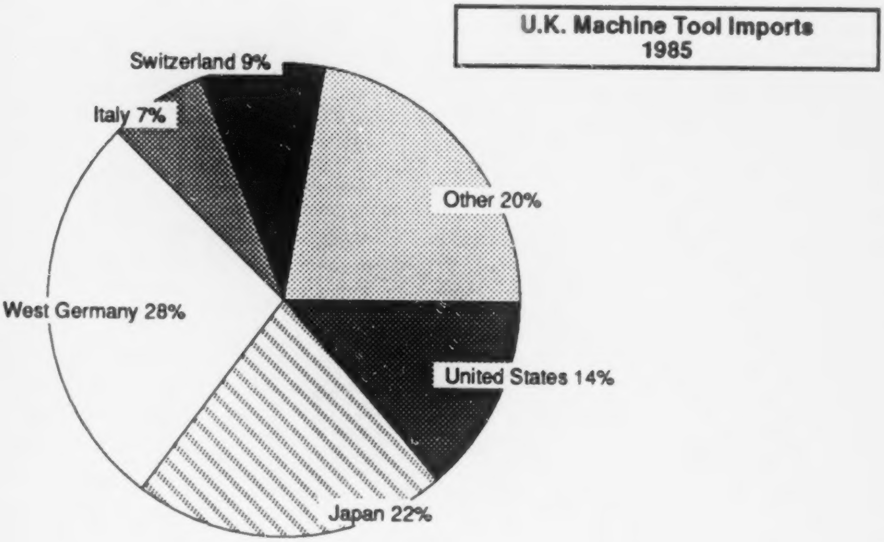
UNITED KINGDOM EXPORTS OF MACHINE TOOLS
By Destination, 1985 to 1989
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL EXPORTS	$344.7	$394.9	$501.0	$695.1	$662.4
United States	88.7	94.5	97.3	110.8	106.7
West Germany	33.0	44.9	52.7	72.0	76.9
Belgium	6.1	7.6	21.1	32.8	57.9
France	17.3	27.5	34.5	55.6	43.9
Italy	6.5	16.0	24.7	36.9	34.6
Spain	3.6	6.1	29.4	22.4	23.9
Ireland	7.0	8.7	11.8	15.3	21.8
Australia	9.8	11.6	15.0	16.6	20.3
Iraq	4.8	(a)	4.7	56.1	20.3
Sweden	9.3	10.7	18.4	13.8	16.6
China	13.8	18.2	10.2	18.0	15.6
South Africa	7.3	4.2	8.4	17.3	14.9
Switzerland	8.1	10.5	11.1	14.1	14.3
Egypt	3.6	2.5	5.3	10.3	13.8
Canada	19.0	17.2	23.7	14.8	11.8
India	11.5	13.0	9.6	9.9	(a)
Soviet Union	9.2	3.2	14.8	14.6	(a)
All Other Countries	86.1	98.5	108.3	163.8	169.0

Source: The Machine Tool Technologies Association

UNITED KINGDOM IMPORTS OF MACHINE TOOLS





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E – estimated from fragmented data, N.E.C. – not elsewhere classified

UNITED KINGDOM EXPORTS OF MACHINE TOOLS

By Type of Machine, 1986–1989

(millions of U.S. dollars)

	UNITS				VALUES			
Type of machine	1986	1987	1988	1989	1986	1987	1988	1989
TOTAL MACHINE TOOLS	24,448	37,771	na	na	$394.9	$501.0	$695.1	$662.4
Electro–Physical	202	140	4530	28,703	$7.5	$6.1	$31.7	$33.4
Lathes	5,761	6,516	na	na	84.4	94.9	178.1	152.5
NC	217	338	969	1,123	21.0	31.6	102.3	83.1
Non–NC	3,826	3,880	na	na	52.5	51.1	62.3	51.5
Used & Rebuilt	1,718	2,318	na	na	10.9	12.1	13.5	17.9
Plane, Shape, Slot, Broach	308	291	151	494	4.0	6.2	3.2	11.6
Sawing & Cut–off	1,886	1,653	2,566	2,669	11.4	17.0	11.8	7.7
Milling Machines	1,461	2,227	6,599	8,742	41.2	42.8	58.4	44.4
NC	438	521	3,307	513	24.6	24.7	21.0	16.1
Non–NC	1,023	1,706	3,292	8,229	16.6	18.0	37.4	28.4
Drilling Machines	1,599	2,051	2,909	3,629	10.1	20.8	17.5	9.5
NC	22	47	70	1,009	1.9	7.9	2.7	2.1
Non–NC	1,577	2,004	2,839	2,620	8.2	12.9	14.8	7.4
Boring Machines	492	583	1,544	1,716	21.1	43.4	30.1	31.2
NC	56	139	57	130	12.3	31.3	13.5	19.7
Non–NC	436	444	1,487	1,586	8.8	12.1	16.6	11.5
Grinding & Polishing	3,025	3,912	4,840	13,428	51.5	68.8	84.8	78.0
NC	49	118	164	222	12.9	18.5	32.8	21.8
Non–NC	2,976	3,794	4,676	13,206	38.6	50.3	52.0	56.2
Honing & Lapping	303	290	241	212	4.1	7.2	5.9	3.8
Gear Cutting Machines	129	95	674	635	3.2	4.1	13.5	8.2
NC	16	6	19	4	0.6	1.5	2.5	1.6
Non–NC	113	89	655	631	2.6	2.6	11.0	6.6
Threading & Tapping	239	384	284	1,815	1.2	3.0	6.8	7.5
Machining Centers	411	496	748	873	41.8	55.7	64.5	77.4
Unit Const. & Transfer	29	29	223	459	8.4	8.2	20.0	32.3
Presses	1,083	1,287	1,537	4,582	30.5	36.9	30.3	23.1
Bend, Fold, Flatten	1,010	762	2,509	5,355	20.7	30.3	52.4	53.5
NC	25	35	242	312	6.0	7.9	12.1	8.5
Non–NC	985	727	2,267	5,043	14.7	22.5	40.3	44.9
Punching & Shearing	773	783	1,370	2,136	15.8	17.9	26.4	19.7
NC	61	70	106	211	7.5	9.0	7.1	4.9
Non–NC	712	713	1,264	1,925	8.4	8.9	19.2	14.8
Forging & Stamping	33	65	280	1,122	1.8	4.9	13.0	23.5
NC	1	17	3	13	0.6	1.8	0.4	0.5
Non–NC	32	48	277	1,109	1.2	3.1	12.6	23.0
Machines for Working Wire	306	481	1,002	1,313	4.7	3.8	12.3	5.9
Other Machine Tools	5,398	15,726	4,311	11,827	30.7	28.7	34.2	39.5

Source: Department of Trade and Industry Individual items may not add to total due to rounding.

THE WEST GERMAN MACHINE TOOL INDUSTRY

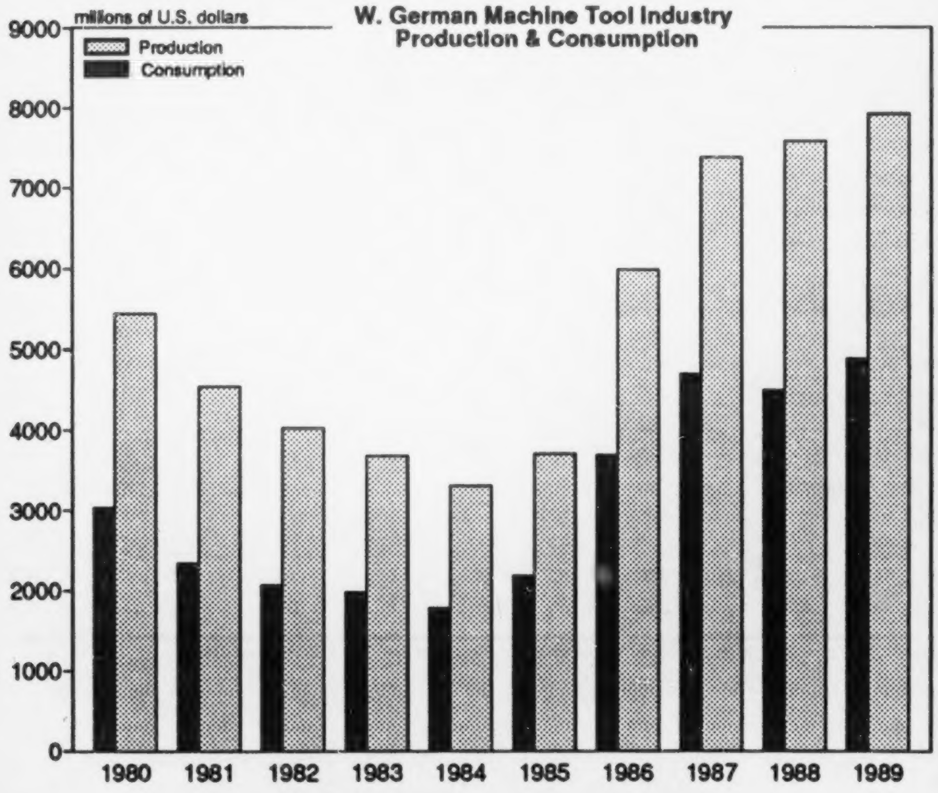
1975 to 1989

(millions of U.S. dollars)

	Production	Exports	Imports	Consumption	% Import Penetration	Exports as % of Prod.	Employees
1975	$2,751.7	$2,078.2	$271.5	$945.0	28.7%	75.5%	109,300
1976	2,766.5	1,991.3	296.7	1,072.3	27.7	72.0	101,400
1977	3,051.0	2,129.0	397.5	1,319.4	30.1	69.8	95,900
1978	3,823.1	2,484.8	570.0	1,908.3	29.9	65.0	94,800
1979	4,690.9	2,904.7	756.7	2,543.0	29.8	61.9	95,000
1980	5,439.8	3,391.6	994.1	3,042.3	32.7	62.3	98,000
1981	4,545.1	2,982.7	774.8	2,337.2	33.2	65.6	97,000
1982	4,034.0	2,588.0	623.1	2,069.2	30.1	64.2	93,000
1983	3,681.9	2,282.9	586.3	1,985.3	29.5	62.0	83,700
1984	3,313.9	2,125.2	598.8	1,787.5	33.5	64.1	83,000
1985	3,712.3	2,315.6	785.0	2,181.7	36.0	62.4	88,000
1986	5,993.1	3,633.9	1,337.3	3,696.5	36.2	60.6	93,000
1987	7,384.0	4,251.7	1,571.7	4,704.0	33.4	57.6	93,500
1988	7,585.1	4,692.5	1,606.9	4,499.5	35.7	61.9	94,000
1989	7,929.8	4,881.4	1,848.4	4,896.8	37.7	61.6	97,500

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

Note: Machine tool industry figures include parts.



WEST GERMAN IMPORTS OF MACHINE TOOLS

1985 to 1988

(millions of U.S. dollars)

	UNITS				VALUES			
	1985	1986	1987	1988	1985	1986	1987	1988
MACHINE TOOL TOTAL	83,345	69,292	66,360	423,012	$586.2	$1,021.3	$1,174.5	$1,239.5
METAL CUTTING TOTAL	64,891	49,669	45,575	388,783	440.4	778.6	891.1	939.3
Planing, Shaping, Broaching	126	156	98	90	1.5	1.7	2.9	2.7
Turret & Automatic Lathes	1,336	1,905	1,876	3,230	47.0	88.3	101.7	113.2
Other Lathes	7,245	9,322	7,625	6,399	65.4	116.7	116.1	110.9
Drilling Machines	6,926	9,145	12,012	176,291	67.9	125.9	119.3	36.6
Milling Machines, Horiz. Boring & Milling Mach.	4,640	7,003	6,389	8,170	98.7	182.2	184.6	165.5
Saws and Filing Mach.	6,716	9,646	8,678	11,229	12.6	20.0	21.4	22.4
Grinding, Honing, Polishing	35,282	9,379	5,816	177,956	84.4	142.0	211.5	193.2
Gear Cutting Machines	81	75	80	134	7.8	9.6	17.4	24.8
Other Metal Cutting	2,539	3,038	3,001	5,284	55.0	92.2	116.2	270.1
METAL FORMING TOTAL	16,079	16,776	17,360	34,319	145.8	242.7	283.4	300.2
Hammers, Forging, Riveting, Bending & Straight. Mach.	1,944	1,644	2,005	5,182	7.7	13.3	19.1	52.6
Presses:								
Mechanical	1,455	2,146	2,085	1,893	12.3	21.6	26.6	24.3
Hydraulic	1,452	1,260	1,463	1,846	15.3	26.9	35.8	26.8
Sheet Metalworking Mach., Including Shears	4,652	5,245	6,122	19,600	49.6	77.8	92.6	103.6
Wire Working Mach.	2,840	2,802	2,683	2,484	35.1	51.6	59.6	53.4
Bolt, Screw & Nut Mach.	309	465	309	330	9.1	25.4	15.3	19.0
Other Metal Forming	3,427	3,214	2,693	2,984	16.7	26.1	34.4	20.6
Parts and Accessories								
Metal Cutting	—	—	—	—	76.1	127.3	151.3	219.2
Metal Forming	—	—	—	—	73.1	121.7	166.8	120.8
Other Metalworking (incl. parts & accessories)[1]	2,375	2,847	3,425	—	49.6	66.8	79.3	27.4

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[1] Includes nuclear materials handling machines, presses for treating metals, and industrial plant components. Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V." Individual items may not add to totals due to rounding.

WEST GERMAN IMPORTS OF METAL CUTTING MACHINE TOOLS
By Country of Origin, 1985–1989
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL IMPORTS	$440.4	$778.6	$891.1	$939.3	$1,102.2
Austria	18.9	34.8	50.2	47.4	60.0
Belgium–Luxembourg	4.6	8.5	11.5	8.2	9.6
China	na	4.9	9.2	10.2	14.7
Czechoslovakia	6.3	13.1	9.7	9.2	13.7
Denmark	1.9	4.2	3.4	4.9	4.3
France	16.7	31.5	31.7	23.5	39.7
Hungary	2.6	5.2	4.2	5.6	5.9
Italy	50.8	79.9	93.1	95.2	103.1
Japan	102.8	192.7	162.6	217.5	286.8
Netherlands	5.0	7.9	17.1	20.7	16.8
Poland	2.0	3.9	4.9	3.6	5.3
Soviet Union	4.5	4.8	5.3	5.8	9.4
South Korea	na	4.4	3.3	3.6	4.2
Spain	13.8	22.2	29.5	30.1	38.9
Sweden	14.2	17.5	31.8	27.7	25.0
Switzerland	142.8	260.6	302.1	289.9	304.5
Taiwan	na	14.0	24.6	29.7	31.0
United Kingdom	16.7	30.3	39.8	56.8	58.0
United States	16.2	19.3	37.0	30.2	40.8
Yugoslavia	2.1	4.2	4.4	4.6	6.6
Other Countries	na	14.7	15.7	14.9	23.9

WEST GERMAN IMPORTS OF METAL FORMING MACHINE TOOLS
By Country of Origin, 1985–1989
(millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL IMPORTS	$145.8	$242.7	$283.4	$300.2	$316.3
Austria	4.6	8.7	15.1	12.1	15.4
Belgium–Luxembourg	8.0	15.8	16.1	20.9	17.9
China	na	0.1	0.1	0.1	0.1
Czechoslovakia	0.8	1.1	2.0	1.9	1.6
Denmark	2.9	3.8	5.6	8.9	8.9
France	10.0	13.3	17.8	22.1	28.7
Hungary	0.7	0.8	1.2	1.7	1.9
Italy	21.4	47.5	55.7	47.5	56.4
Japan	13.4	22.9	20.1	27.0	14.0
Netherlands	6.3	10.3	14.9	14.7	21.8
Poland	0.1	0.4	(a)	(a)	0.1
South Korea	na	(a)	(a)	(a)	0.1
Soviet Union	0.3	0.8	0.6	1.0	1.2
Spain	4.7	8.7	10.3	11.5	16.1
Sweden	3.0	4.4	5.8	6.1	6.1
Switzerland	43.1	71.9	85.2	67.9	67.3
United Kingdom	4.7	6.8	8.4	13.0	12.0
United States	16.6	18.9	15.8	31.8	30.8
Yugoslavia	0.3	1.0	1.5	0.8	1.8
Taiwan	na	0.4	0.2	0.6	3.1
Other Countries	na	5.1	7.0	10.7	11.0

Note: Totals for individual countries exclude other metalworking machinery and exclude parts.
Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

UNITED KINGDOM IMPORTS OF MACHINE TOOLS 1988
By Type of Machine and Country of Origin, Units and Values
(millions of U.S. dollars)

	Total		W. Germ.		Italy		Switz.		France		Japan		U.S.		Others	
	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
Physico–Chem.	1,764	42.0	132	7.1	137	2.5	177	5.9	66	0.6	385	12.5	168	5.1	699	8.4
EDM	982	25.5	38	3.6	14	0.3	122	5.1	7	(a)	348	11.0	95	2.1	358	3.5
Other	782	16.5	94	3.5	123	2.2	55	0.8	59	0.6	37	1.5	73	3.0	341	4.9
Machining Ctrs	723	70.9	213	24.3	1	0.2	16	1.2	25	1.8	246	29.1	38	6.8	84	7.5
Horizontal	169	31.2	60	11.5	1	0.2	2	0.5	2	0.5	68	12.8	10	2.3	26	3.5
Vert.& Comb.	279	30.2	53	7.9	–	–	4	0.4	5	0.5	133	15.1	48	4.0	36	2.2
Unclassified	275	9.5	100	4.8*	–	–	10	0.3	18	0.8	45	1.3	80	0.5	22	1.8
Unit Construction	23	6.8	11	2.3	–	–	4	1.9	2	1.4	2	0.4	11	0.1	3	0.7
Transfer	76	14.0	4	0.3	2	0.1	8	1.9	2	0.2	46	8.4	2	0.8	12	2.3
Lathes	2,414	140.7	273	26.5	101	3.9	70	5.9	128	2.9	770	64.9	119	7.6	953	29
NC	1,195	111.8	161	22.7	28	2.0	20	4.1	28	2.1	650	59.8	81	5.4	227	15.7
Non–NC	1,219	28.9	112	3.8	73	1.9	50	1.8	100	0.8	120	5.1	38	2.2	726	13.3*
Way Type	12	1.2	2	0.2	–	–	3	0.3	2	0.3	1	0.1	–	–	4	.03*
Drilling	1,933	14.3	438	3.7	220	1.7	72	0.4	140	0.7	47	1.5	272	3.0	744	3.3
NC	106	7.8	25	2.6	14	0.7	–	–	2	0.1	29	1.3	27	2.5	9	.6
Non–NC	1,827	6.5	413	1.1	206	1.0	72	0.4	138	0.6	18	0.2	245	0.5	735	2.7
Boring	795	20.5	117	5.0	57	0.6	24	1.8	14	0.1	35	1.1	184	5.6	364	6.3
NC	103	11.7	14	2.5	–	–*	5	1.2	–	–	4	0.2	63	5.2	17	2.6
Non–NC	692	8.8	103	2.5	57	0.6	19	0.6	14	0.1	31	0.9	121	0.4	347	3.7
Milling	2,890	47.1	289	16.6	122	2.4	23	3.0	42	4.0	44	1.5	61	1.7	2,309	17.9
NC	300	26.6	133	15.0	5	0.9	9	2.5	23	3.4	3	0.2	9	0.4	118	4.2
Non–NC	2,590	20.5	156	1.6	117	1.5	14	0.5	19	0.6	41	1.3	52	1.3	2,191	13.7
Thread & Tap	1,119	6.4	98	0.8	82	0.4	22	0.1	18	0.2	451	1.6	47	0.6	401	2.7
Grinding	2,863	64.9	893	19.0	265	4.4	150	12.6	75	1.4	124	5.9	410	8.3	1,083	13.3
NC	164	25.7	52	8.2	5	1.2	31	4.9	1	0.1	25	4.4	28	5.1	22	1.8*
Non–NC	2,639	36.1	831	9.9*	258	3.1*	113	6.6	73	1.3*	95	1.2*	357	2.7*	912	11.3*
Hone & Lap	60	3.1	10	0.9	2	0.1	6	1.1	1	(a)	4	0.3	25	0.5	12	0.2
Shape,Slot,etc.	55	2.7	6	0.6	3	(a)	1	0.2	3	0.1	5	(a)	21	1.4	16	0.4

continued

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UNITED KINGDOM IMPORTS OF MACHINE TOOLS 1988

By Type of Machine and Country of Origin, Units and Values

(millions of U.S. dollars)

	Total		W. Germ.		Italy		Switz.		France		Japan		U.S.		Others	
	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value	Units	Value
continued																
Gear Cutting	387	16.2	108	10.0	61	0.3	19	0.5	11	0.1	5	0.1	45	2.1	138	3.1
NC	68	9.6	56	6.4	–	–	–	–	1	a	–	–	5	1.3	6	1.9
Non–NC	319	6.6	52	3.6*	61	0.3	19	0.5	10	0.1	5	0.1*	40	0.8	132	1.2
Saw, Cut–Off	11,140	25.1	5,724	11.3	1,675	3.3*	33	0.1*	226	1.4*	2,120	2.2	225	2.5	1,137	4.3
Other Cutting	2,864	9.9	754	2.6*	229	0.9*	41	1.4	55	0.2*	44	1.7	126	1.1*	1,615	2.0
Used Cutting	781	13.5	119	3.7	75	0.9	18	1.0	31	1.2	19	0.8	139	1.7*	380	4.2
Forge & Stamp	273	10.0	82	1.6	10	0.2	28	1.0	17	0.3	30	2.3	25	0.3	81	4.3
NC	11	2.6	2	0.5	–	–	3	0.4	–	–	–	–	–	–	6	1.7
Non–NC	262	7.4	80	1.1	10	0.2	25	0.6	17	0.3	30	2.3	25	0.3	75	2.6
Punch & Shear	5,152	69.1	269	12.6	274	2.9	31	2.4	106	2.7	246	14.3	2,154	21.9	2,082	12.3
NC	284	32.3	54	9.4	24	1.0	6	0.8	14	1.0	110	12.4	19	3.1	57	4.6
Non–NC	4,868	36.8	215	3.2*	250	1.9*	25	1.6	92	1.7	136	1.9	2,135	18.8*	2,015	7.7
Presses	2,323	59.9	547	6.9	322	2.8	28	0.8	101	3.5	91	27.2	205	3.2	1,029	15.5
NC	43	30.7	6	1.5	–	–	1	a	11	0.8	7	25.4	2	0.8	16	2.2
Non–NC Hydraulic	657	11.3	95	1.1*	23	0.5*	10	0.3	53	1.9	10	0.7	48	0.6	418	6.2
Non–NC Other	1,623	17.9	446	4.3*	299	2.3*	17	0.5	37	0.8	74	1.1	155	1.8*	595	7.1
Draw Benches	129	5.8	78	3.7*	22	1.1	4	0.2	6	0.1*	6	0.4	2	a	11	0.3
Wire Working	447	7.7	109	1.8	4	0.3	29	1.3	17	0.3	64	1.4	74	0.8	150	1.8
Other Forming	9,075	30.4	3,187	14.1*	1,987	5.7*	834	4.3	218	0.5	1,056	1.7*	719	1.2*	1,075	2.9
Total NC cutting	2,659	264.1	654	81.4	53	5.0	81	13.9	80	7.5	957	95.0	351	26.7	483	34.6
Total non–NC cutting	26,963	231.9	8,603	52.4	3,010	16.7	488	24.2	889	9.2	3,163	36.7	596	21.6	10,214	71.1
Total NC forming	560	79.4	96	15.2	30	1.1	23	2.3	33	1.9	123	38.0	68	8.8	187	12.1
Total non–NC forming	20,440	148.5	4,882	35.1	2,873	14.8	985	9.4	712	8.1	1,564	13.8	3,351	27.9	6,073	39.4
Total *	50,622	723.8	14,235	184.0	5,966	37.5	1,577	49.8	1,714	26.8	5,807	183.4	4,366	85.0	15,957	157.3

**excludes some low value items, possibly misclassified. (a) – value less than $50,000 Source: The Machine Tool Technologies Association*

WEST GERMAN PRODUCTION OF MACHINE TOOLS

1985 to 1989

(millions of U.S. dollars)

	UNITS					VALUE				
	1985	1986	1987	1988	1989	1985	1986	1987	1988	1989
MACHINE TOOL TOTAL	165,750	124,884	126,150	129,841	143,599	$3,168.5	$5,185.3	$6,402.5	$6,572.2	$6,867.7
METAL CUTTING TOTAL	98,286	82,354	78,519	80,492	91,640	2,238.3	3,743.6	4,652.6	4,728.8	4,783.5
Planing, Shaping, Broaching	397	404	273	252	275	21.4	27.0	27.4	36.5	30.8
Automatic & Turret Lathes	2,786	3,274	2,738	2,436	2,936	285.4	467.1	642.2	618.4	667.0
Other Lathes	6,367	6,892	6,723	7,367	8,374	239.8	377.9	424.7	452.7	450.5
Drilling Machines	13,380	15,212	16,633	14,980	14,770	89.4	139.1	152.7	155.0	153.1
Milling , Horiz. Boring & Milling	8,080	8,883	8,233	7,648	9,132	407.8	653.0	724.0	775.4	801.7
Saws and Filing Machines	14,284	11,446	8,856	7,686	9,163	72.7	112.2	120.7	142.3	174.2
Grinding, Honing, Polishing	35,602	16,338	16,989	19,965	20,738	408.2	668.7	850.1	827.3	879.3
Gear Cutting Machines	923	1,133	1,040	964	919	106.3	186.0	233.1	230.8	229.0
Other Cutting Machines	16,467	18,772	17,024	19,194	25,333	607.2	1,112.7	1,477.6	1,490.4	1,398.0
METAL FORMING TOTAL	67,464	42,530	47,631	49,349	51,959	930.2	1,441.7	1,749.9	1,843.4	2,084.2
Hammers, Forging, Riveting Bending & Straight.	3,564	4,079	3,861	3,794	3,633	108.4	151.6	210.7	205.3	254.4
Mechanical Presses	11,307	13,841	11,342	11,654	14,451	159.4	267.1	335.5	307.0	398.1
Hydraulic Presses	1,979	2,165	1,931	2,334	2,577	149.9	255.5	276.6	296.9	332.7
Sheet Metalworking Mach., including Shears	42,498	14,509	13,998	14,583	14,922	305.5	467.9	541.8	612.7	682.9
Wire Working Machines	7,720	7,526	15,991	16,577	15,988	174.4	242.5	306.9	324.5	359.2
Bolt, Screw, Nut Machines	396	410	537	407	388	32.6	57.1	78.3	97.0	56.8
Parts & Accessories										
Metal Cutting	—	—	—	—	—	356.2	531.4	654.4	681.7	745.8
Metal Forming	—	—	—	—	—	187.6	276.7	327.4	331.4	316.3

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V." Individual items may not add to totals due to rounding.

Notes: Figures include West Berlin. Totals include some unclassified items.

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WEST GERMAN EXPORTS OF METAL CUTTING MACHINE TOOLS

By Destination, 1985–1989

(in millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL EXPORTS	$1,233.3	$2,011.6	$2,325.4	$2,631.9	$2,769.3
Argentina	4.3	3.0	7.5	4.9	4.7
Australia	13.9	18.9	13.9	11.5	7.2
Austria	50.9	127.3	128.4	200.3	153.6
Belgium–Luxembourg	37.0	53.2	84.5	73.5	76.2
Brazil	7.0	17.6	29.5	38.1	34.7
Bulgaria	26.6	43.0	65.1	40.0	24.3
Canada	20.5	26.5	41.0	28.0	34.1
China	36.9	112.6	79.5	55.6	57.9
Czechoslovakia	19.4	21.2	32.5	37.1	53.9
Denmark	19.5	34.9	30.1	28.4	24.8
France	81.5	146.5	175.7	262.5	261.8
Greece	na	na	3.6	5.0	3.1
Hungary	4.9	7.4	19.6	13.1	13.3
India	22.5	37.0	57.1	44.9	43.7
Indonesia	5.0	2.8	6.1	4.3	3.0
Iran	na	20.2	51.1	92.1	66.9
Iraq	3.9	na	na	na	57.8
Ireland	na	4.1	2.9	2.3	4.7
Israel	6.8	8.3	6.9	2.1	2.1
Italy	49.8	88.3	202.7	174.5	196.1
Japan	28.6	61.9	36.1	35.8	51.4
Mexico	15.8	17.2	14.5	20.5	9.7
Netherlands	40.3	68.1	71.3	69.9	69.6
Norway	9.6	17.6	9.4	10.8	6.7
Poland	14.9	17.5	24.3	32.5	39.9
Portugal	4.3	4.4	4.7	9.8	8.0
Romania	0.7	1.4	(a)	(a)	(a)
Singapore	3.7	4.6	6.3	5.6	9.8
South Africa	14.0	6.3	5.6	13.4	23.4
South Korea	na	30.2	32.6	63.9	60.9
Soviet Union	132.8	207.7	170.1	362.3	352.7
Spain	11.6	15.1	30.2	46.5	49.8
Sweden	56.1	77.2	89.3	93.6	153.4
Switzerland	68.8	135.7	169.9	157.2	155.3
Taiwan	3.6	7.4	14.8	10.0	15.9
Turkey	na	na	na	na	24.4
United Kingdom	91.3	141.8	134.0	178.3	165.9
United States	183.6	285.7	314.0	222.3	303.7
Venezuela	2.8	1.4	5.1	5.2	9.7
Yugoslavia	24.4	53.6	69.6	42.0	59.4
Other Countries	na	na	na	na	75.8

(a) – less than $50,000 Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

Note: Totals for individual countries exclude other metalworking machinery and exclude parts.

WEST GERMAN EXPORTS OF METAL FORMING MACHINE TOOLS

By Destination, 1985–1989

(in millions of U.S. dollars)

	1985	1986	1987	1988	1989
TOTAL EXPORTS	$573.3	$869.4	$980.7	$1,122.1	$1,152.6
Argentina	0.9	1.5	2.6	6.6	4.7
Australia	9.2	9.1	12.3	7.6	7.2
Austria	20.3	34.3	41.9	52.2	41.2
Belgium–Luxembourg	14.8	22.3	33.3	42.9	36.7
Brazil	4.1	9.9	11.3	9.4	6.0
Bulgaria	16.4	12.0	14.8	21.4	5.9
Canada	9.9	44.7	48.2	9.6	13.1
China	36.1	72.4	68.7	44.8	40.3
Czechoslovakia	8.6	17.1	19.0	15.1	17.5
Denmark	7.5	11.0	8.9	13.8	11.8
France	32.6	55.6	72.9	83.3	89.0
Greece	na	na	2.5	4.1	8.4
Hungary	7.7	3.6	6.3	4.8	7.3
India	12.1	21.8	15.2	19.9	13.6
Indonesia	1.5	2.0	3.4	5.0	7.0
Iran	na	10.9	36.4	44.8	17.6
Iraq	3.9	na	na	35.1	18.8
Ireland	na	2.8	2.7	4.0	3.3
Israel	4.7	5.6	6.3	8.3	3.2
Italy	23.7	41.3	67.1	96.2	124.1
Japan	16.6	23.4	23.7	18.7	38.7
Mexico	4.0	8.6	7.5	3.5	4.9
Netherlands	22.1	42.5	42.1	44.5	46.4
Norway	5.3	10.0	10.4	9.3	4.0
Poland	4.1	8.9	14.5	18.4	19.4
Portugal	1.6	2.5	4.0	10.6	5.6
Romania	1.7	0.1	0.6	0.8	(a)
Singapore	1.1	1.2	3.2	2.5	4.3
South Africa	10.0	3.4	5.4	8.9	7.7
South Korea	na	13.1	18.8	18.5	48.4
Soviet Union	38.1	59.9	53.7	84.4	94.5
Spain	8.3	13.4	23.6	30.7	56.7
Sweden	13.0	18.8	25.8	51.0	36.7
Switzerland	24.5	47.4	49.4	55.7	65.1
Taiwan	5.3	4.4	9.5	16.7	15.2
United Kingdom	31.6	40.9	51.8	69.2	63.5
United States	50.1	114.9	64.2	58.0	77.6
Venezuela	1.5	3.4	1.4	7.2	3.8
Yugoslavia	15.6	13.3	29.4	16.4	12.7
Other Countries	na	na	na	68.2	70.7

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."

Note: Totals for individual countries exclude other metalworking machinery and exclude parts.

WEST GERMAN EXPORTS OF MACHINE TOOLS
1985 to 1988
(millions of U.S. dollars)

	UNITS				VALUES			
	1985	1986	1987	1988	1985	1986	1987	1988
MACHINE TOOL TOTAL	189,934	86,936	82,539	156,113	$1,806.6	$2,881.0	$3,306.1	$3,754.0
METAL CUTTING TOTAL	159,505	55,422	51,260	111,309	1,233.3	2,011.6	2,325.4	2,631.9
Planing, Shaping, Broaching	288	365	301	322	8.8	18.3	13.6	23.0
Turret & Automatic Lathes	2,621	2,528	2,407	2,909	164.9	249.0	269.4	392.3
Other Lathes	3,175	2,921	3,055	2,689	144.1	204.2	273.0	236.9
Drilling Machines	12,206	10,208	12,150	14,283	68.0	139.9	157.7	78.3
Milling Machines, Horiz. Boring & Milling Mach.	6,262	7,328	6,726	6,057	249.8	430.5	430.0	433.1
Saws and Filing Mach.	9,862	8,985	7,799	11,302	57.1	83.6	82.3	118.6
Grinding, Honing, Polishing	119,573	17,550	13,680	65,199	299.4	488.1	581.7	567.6
Gear Cutting Machines	545	554	587	755	44.6	66.7	90.5	120.3
Other Metal Cutting	4,973	4,983	4,555	7,793	196.6	331.1	427.2	661.7
METAL FORMING TOTAL	27,927	28,218	28,227	44,804	573.3	869.4	980.7	1,122.1
Hammers, Forging, Riveting, Bending & Straight.	3,129	2,917	2,783	11,032	76.5	57.1	108.1	149.7
Presses:								
Mechanical	4,067	4,680	6,104	4,065	56.3	122.5	133.2	111.0
Hydraulic	1,828	1,387	970	2,222	57.7	96.3	98.8	153.0
Sheet Metalworking Mach., Including Shears	8,493	9,083	8,908	19,698	187.7	286.7	285.7	361.2
Wire Working Mach.	5,318	5,759	4,907	3,818	124.1	193.0	199.1	179.2
Bolt, Screw, Nut Mach.	551	536	461	495	29.3	41.6	51.3	50.5
Other Metal Forming	4,541	3,856	4,094	3,474	41.7	72.3	104.6	117.5
Parts and Accessories								
Metal Cutting	—	—	—	—	183.1	271.2	321.7	344.4
Metal Forming	—	—	—	—	161.8	231.3	275.5	278.2
Other Metalworking Mach.(incl. parts & accessories)*	2,502	3,296	3,052	—	163.8	250.4	348.3	316,046

Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V." Individual items may not add to totals due to rounding.

Note: *Includes nuclear materials handling machines, presses for treating metals, and industrial plant components.

WEST GERMAN IMPORTS OF MACHINE TOOLS

By Type of Machine and Origin, 1989

(millions of U.S. dollars)

	Machine Tool Total*	Boring Machines	Milling Machines	Shape, Slot,Saw, Broach	Lathes, Turning Machines	Grinding, Honing, Lapping	Thermo & Electro-Chemical	Trans. Lines	Machining Centers	Gear Cutting Machines
TOTAL	$1,479.2	$129.3	$97.1	$30.4	$295.6	$179.9	$165.9	$25.7	$134.3	$20.5
Austria	78.3	4.6	7.9	1.6	33.2	8.2	0.7	2.6	0.8	(a)
Belgium-Luxem.	27.7	0.8	0.4	0.4	5.2	0.7	0.3	0.0	1.0	0.0
Brazil	8.1	0.1	0.1	0.0	4.2	0.1	0.1	3.3	0.0	(a)
China	14.8	2.8	2.3	(a)	7.2	2.1	(a)	0.0	0.2	0.0
Czechoslovakia	15.2	5.9	2.4	0.1	3.3	1.5	0.0	0.0	0.0	0.2
Denmark	14.0	0.5	0.4	0.2	0.3	2.6	0.1	0.0	0.0	0.0
France	70.5	1.5	14.1	2.1	7.6	3.5	3.1	0.5	5.6	0.1
Hungary	7.8	0.3	0.3	(a)	1.0	0.3	0.0	0.0	3.9	0.0
Italy	165.8	10.3	10.8	12.6	30.7	23.7	3.4	1.1	4.0	0.8
Japan	307.6	19.1	3.3	2.6	109.0	5.1	59.1	3.7	83.1	(a)
Netherlands	40.6	1.1	1.3	1.1	2.4	6.9	0.5	0.5	3.6	0.1
Soviet Union	10.7	1.6	2.3	0.0	1.9	3.6	0.0	0.0	0.0	0.0
Spain	55.8	7.4	14.8	2.6	5.9	1.7	0.7	0.0	5.2	0.0
Sweden	32.2	1.8	0.9	0.2	5.0	15.5	0.4	0.2	0.1	0.0
Switzerland	396.9	53.2	22.6	3.2	35.9	75.2	73.4	7.8	7.4	17.0
Taiwan	34.1	6.8	1.7	0.6	9.7	3.4	3.1	0.0	5.6	0.0
United Kingdom	71.8	8.2	3.0	0.8	19.7	8.1	0.7	5.8	10.9	0.4
United States	80.6	0.8	3.1	0.5	1.9	13.2	18.3	0.0	1.3	1.1
Yugoslavia	8.5	0.8	1.4	0.5	2.4	0.9	0.0	0.1	0.0	0.5
All Others	38.2	1.7	4.2	1.1	9.3	3.5	1.9	0.1	1.5	0.3

WEST GERMAN IMPORTS OF MACHINE TOOLS

By Type of Machine and Origin, 1989

(millions of U.S. dollars)

	Other Metal Cutting	Presses	Bending, Folding, Forming	Punching and Shearing	Hammers, Forging Machines	Drawing Machines	Wire,Flat Profile Machines	Other Metal Form. Machines	Other Machine Tools
TOTAL	$8.0	$64.8	$82.8	$100.7	$9.9	$7.2	$24.1	$24.4	$60.7
Austria	0.3	4.9	6.6	0.4	0.1	0.1	2.0	1.3	3.0
Belgium–Luxem.	0.2	3.9	6.6	6.2	0.1	0.3	0.2	0.3	0.2
Brazil	(a)	0.1	0.0	0.1	0.0	0.0	0.0	(a)	0.1
China	0.0	(a)	(a)	(a)	0.1	0.0	0.0	0.0	0.0
Czechoslovakia	0.0	0.9	(a)	0.0	0.3	0.0	0.0	0.3	0.0
Denmark	0.0	1.4	4.0	3.3	0.1	(a)	0.0	0.1	0.7
France	0.6	6.9	5.3	12.6	0.8	0.2	0.3	2.4	2.1
Hungary	0.0	(a)	0.3	0.7	0.0	0.2	0.6	0.0	(a)
Italy	4.0	13.1	16.0	11.3	1.1	2.2	3.4	8.7	6.4
Japan	0.2	2.4	3.9	6.4	0.0	0.1	0.7	0.5	6.8
Netherlands	0.2	3.0	8.4	9.2	0.3	0.1	0.2	0.3	1.9
Soviet Union	(a)	1.0	0.1	(a)	0.1	0.1	0.0	0.0	0.0
Spain	0.1	1.2	0.6	7.5	0.7	0.4	4.1	1.0	0.8
Sweden	0.4	0.5	2.8	0.8	(a)	(a)	0.9	1.2	1.1
Switzerland	1.3	11.0	17.0	22.4	3.4	0.4	6.9	5.9	25.1
Taiwan	(a)	2.7	(a)	(a)	0.0	(a)	(a)	0.3	0.0
United Kingdom	0.3	2.0	4.2	1.4	0.7	1.8	0.8	1.1	1.7
United States	0.3	7.2	3.1	15.3	1.0	0.4	3.2	0.6	9.0
Yugoslavia	0.0	0.6	0.2	(a)	0.9	0.0	(a)	(a)	(a)
All Others	0.2	1.9	3.8	3.0	0.4	0.8	0.8	0.3	1.8

** Machine Tool Total includes some unclassified items. Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."*

WEST GERMAN EXPORTS OF MACHINE TOOLS, 1989

(millions of U.S. dollars)

	Machine Tool Total*	Boring Machines	Milling Machines	Shape, Slot,Saw, Broach	Lathes, Turning Machines	Grinding, Honing, Lapping	Thermo & Electro. Chemical	Transfer Lines	Machining Centers	Gear Cutting Machines
TOTAL	$4,236.8	$164.8	$362.2	$135.4	$635.9	$568.8	$152.6	$156.2	$354.7	$127.1
Algeria	38.2	0.2	0.6	0.4	0.9	1.1	0.1	0.0	0.0	0.5
Australia	25.7	0.1	0.9	2.5	0.5	1.2	0.4	0.0	1.4	(a)
Austria	204.6	7.3	16.4	7.1	20.1	19.9	12.6	41.1	20.4	0.2
Belgium	126.8	3.8	10.6	4.6	13.5	9.2	3.1	0.1	16.4	1.5
Brazil	44.3	0.4	11.4	0.4	8.2	9.0	0.0	0.5	1.5	2.3
Bulgaria	36.1	5.4	4.6	0.5	4.3	5.5	1.5	0.0	1.1	0.8
Canada	48.0	0.6	1.9	3.1	15.3	7.0	0.5	0.0	3.6	1.9
China	160.9	5.3	13.6	0.4	8.6	23.4	0.2	(a)	2.4	3.2
Czechoslovakia	73.7	1.6	11.0	3.9	5.9	11.6	7.1	1.0	1.9	1.5
Denmark	37.8	0.6	3.2	2.0	7.4	4.3	2.5	0.0	4.1	0.2
Finland	43.4	4.1	1.8	2.2	8.2	4.9	0.3	0.3	1.9	1.8
France	369.3	13.6	24.4	21.2	66.3	41.2	18.5	16.2	36.1	18.3
Hungary	21.6	0.3	2.1	1.5	1.4	4.0	1.7	0.6	1.1	(a)
India	61.6	2.2	10.4	1.2	11.8	12.1	1.5	0.0	0.7	3.7
Iran	97.4	11.1	11.0	3.6	9.7	12.4	0.0	0.0	5.1	1.1
Iraq	76.7	4.4	22.7	1.3	20.7	2.0	0.7	0.0	4.0	0.0
Italy	337.0	6.0	27.6	8.7	51.7	31.3	26.6	2.1	25.7	14.0
Japan	94.7	1.2	2.9	4.6	7.6	21.8	2.4	0.1	0.6	9.5
Mexico	14.9	1.5	1.6	0.3	2.5	2.5	0.2	0.0	0.3	0.7
Netherlands	121.8	4.6	12.5	8.7	15.8	14.9	3.9	0.3	6.8	0.5
Poland	64.7	0.9	9.2	2.1	8.3	8.7	3.2	0.2	2.7	3.5
South Africa	33.2	1.6	3.1	2.0	8.9	3.4	0.4	0.0	2.8	(a)
South Korea	118.8	1.5	4.1	1.7	12.2	21.2	0.3	0.0	14.3	3.1
Soviet Union	483.3	38.5	36.4	1.3	98.4	87.5	30.3	7.8	36.3	9.0

continued

WEST GERMAN EXPORTS OF MACHINE TOOLS, 1989

(millions of U.S. dollars)

	Machine Tool Total*	Boring Machines	Milling Machines	Shape, Slot,Saw, Broach	Lathes, Turning Machines	Grinding, Honing, Lapping	Thermo & Electro. Chemical	Transfer Lines	Machining Centers	Gear Cutting Machines
continued										
Spain	111.1	2.4	7.3	3.4	13.0	11.0	1.8	0.5	5.1	2.5
Sweden	196.6	3.2	5.7	4.8	30.5	29.0	3.8	46.1	19.1	6.0
Switzerland	229.1	6.0	26.6	9.7	39.4	22.3	7.3	0.7	33.9	4.3
Taiwan	33.7	0.4	6.4	0.3	0.7	6.4	0.7	0.0	(a)	0.9
Turkey	31.7	0.7	8.0	0.7	6.2	4.5	0.1	3.1	0.0	0.8
United Kingdom	245.7	12.8	11.2	12.1	44.6	23.9	4.6	9.0	34.5	8.3
United States	389.9	12.9	28.6	8.3	52.0	76.3	8.2	18.5	54.6	24.9
Yugoslavia	73.7	2.2	8.9	0.9	12.2	12.5	1.6	7.5	11.4	1.7
Other Countries	190.8	4.3	12.3	8.6	23.0	16.6	4.9	0.4	3.2	0.4

WEST GERMAN EXPORTS OF MACHINE TOOLS, 1989

(millions of U.S. dollars)

	Other Metal Cutting	Presses	Bending, Folding, Forming	Punching & Shear. Machines	Hammers, Forging Machines	Drawing Machines	Wire,Flat Profile Machines	Other Forming Machines	Other Machine Tools
TOTAL	21.7	$336.2	$154.8	$260.5	$47.0	$111.0	$137.2	$96.9	$314.9
Algeria	(a)	0.5	0.9	1.7	0.2	(a)	0.4	(a)	30.5
Australia	(a)	0.9	2.4	5.7	1.0	0.5	4.3	1.0	2.7
Austria	0.7	7.8	12.0	7.8	0.8	2.6	4.4	5.8	9.9
Belgium	0.3	5.8	5.6	10.7	0.1	3.2	5.1	6.1	13.9
Brazil	0.3	2.7	0.3	0.9	0.2	0.1	1.0	0.7	3.6
Bulgaria	0.2	1.7	0.3	1.2	0.1	1.0	1.5	(a)	5.9
Canada	0.2	6.4	0.7	0.4	0.9	1.6	2.0	0.9	0.9
China	0.5	5.9	6.9	5.5	0.8	6.5	11.8	2.7	63.0
Czechoslovakia	3.8	1.9	1.6	9.4	1.0	1.2	1.7	0.7	2.3

continued

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WEST GERMAN EXPORTS OF MACHINE TOOLS, 1989

(millions of U.S. dollars)

	Other Metal Cutting	Presses	Bending, Folding, Forming	Punching & Shear. Machines	Hammers, Forging Machines	Drawing Machines	Wire,Flat Profile Machines	Other Forming Machines	Other Machine Tools
continued									
Denmark	(a)	1.8	1.6	4.4	0.1	0.1	2.6	1.3	1.3
Finland	0.4	0.3	8.2	3.4	0.0	2.0	1.2	0.5	1.6
France	0.8	22.8	12.5	26.5	3.9	5.3	8.6	8.7	18.5
Hungary	(a)	2.5	0.5	0.4	0.6	0.3	2.3	0.5	1.1
India	0.0	5.2	2.9	0.6	1.4	0.7	0.6	2.2	4.3
Iran	0.0	8.2	1.9	2.3	0.0	0.9	1.8	2.4	12.9
Iraq	0.1	9.8	1.1	2.0	0.0	0.2	0.9	4.9	0.1
Italy	0.6	60.5	6.5	33.0	1.2	11.2	4.7	6.4	16.8
Japan	0.1	11.4	1.9	11.0	4.3	2.3	3.7	3.7	4.6
Mexico	0.0	1.6	0.3	0.2	0.1	0.8	1.7	0.1	0.2
Netherlands	0.3	13.5	7.6	15.9	0.1	1.4	4.8	2.9	5.8
Poland	0.3	4.1	2.8	2.3	0.3	6.7	0.7	2.3	5.4
Portugal	0.3	1.3	1.1	1.2	0.1	0.5	0.5	0.8	1.5
Singapore	(a)	0.2	1.2	0.8	0.0	0.3	1.4	0.4	1.8
South Africa	0.2	1.4	1.7	0.8	0.9	1.4	1.1	0.2	2.0
South Korea	1.0	24.6	6.5	4.3	1.4	8.9	0.9	1.6	9.6
Soviet Union	2.6	14.6	10.0	24.3	15.4	5.0	18.8	3.7	36.1
Spain	0.6	23.3	9.1	7.3	1.4	7.3	6.1	1.6	4.7
Sweden	1.7	12.0	7.1	10.0	0.3	2.2	2.7	1.9	6.5
Switzerland	1.0	13.6	15.6	21.9	1.8	4.5	4.5	2.8	8.6
Taiwan	0.0	1.2	0.3	2.1	1.0	8.6	0.4	1.7	2.7
Thailand	0.1	1.6	1.0	0.4	0.0	1.6	1.1	0.5	2.6
Turkey	(a)	0.4	0.2	0.5	0.6	1.1	1.3	2.4	0.7
United Kingdom	0.7	25.7	6.2	10.8	1.4	5.4	6.4	7.3	16.3
United States	4.4	23.6	7.9	20.1	2.2	5.5	8.1	9.3	8.6
Yugoslavia	0.2	3.0	2.1	1.7	0.3	1.4	2.1	2.1	1.6
Other Countries	0.3	14.6	5.9	8.9	3.1	8.4	15.9	7.1	6.4

** Machine Tool Total includes some unclassified items. Sources: VDMA, "Fachgemeinschaft Werkzeugmaschinen und Fertigungssysteme"; VDW, "Verein Deutscher Werkzeugmaschinenfabriken e.V."*

CANADIAN MACHINE TOOL EXPORTS 1989

By Type of Machine and Destination

(millions of U.S. dollars)

	Total		United States		Rest of World	
	Units	Value	Units	Value	Units	Value
TOTAL MACHINE TOOLS	4,601	$78.9	2,111	$48.4	2,490	$30.5
Laser, Photon Beam	85	0.5	3	0.3	82	0.2
Ultrasonic Processes	3	(a)	0	0.0	3	(a)
Electrical Discharge Machines	7	0.5	7	0.5	0	0.0
Electro–Chemical Plasma	1,039	0.5	4	0.4	1,035	(a)
Machining Centers	10	0.6	6	0.5	4	0.1
Single Stat. Unit Construc.	1	(a)	1	(a)	0	0.0
Multi–Station Transfer	34	19.1	21	2.7	13	16.4
NC Lathes	8	1.2	7	1.0	1	0.2
Non–NC Lathes	139	1.1	119	1.0	20	0.1
Way–Type Unit Head Machines	na	0.1	na	0.1	na	(a)
NC Drilling Machines	6	0.7	5	0.5	1	0.1
Non–NC Drilling Machines	362	3.4	339	3.2	23	0.2
Boring, Boring–Milling Mach.	36	0.9	28	0.5	8	0.4
NC Milling Machines	3	1.6	3	1.6	0	0.0
Non–NC Milling Machines	29	0.6	21	0.3	8	0.3
Threading & Tapping Machines	16	0.3	6	0.1	10	0.2
Flat Surface Grinding Machines	7	0.3	3	0.3	4	0.1
Other Grinding Machines	107	2.5	95	1.9	12	0.6
Tool or Cutter Grinding	138	0.7	86	0.5	52	0.2
Honing or Lapping Machines	26	0.2	20	0.2	6	(a)
Deburring, Polishing, etc.	45	0.3	9	(a)	36	0.2
Shaping & Slotting Machines	6	0.2	2	0.1	4	0.1
Gear Cutting Machines	9	1.1	4	0.2	5	0.9
Sawing & Cut–Off Machines	146	1.3	131	1.1	15	0.2
Filing or Engraving Machines	227	0.7	113	0.4	114	0.3
Forging Machines	62	1.5	60	1.4	2	(a)
NC Bending, Folding, etc.	109	7.6	63	5.5	46	2.1
Non–NC Bend, Fold, etc.	948	6.5	249	5.1	699	1.4
NC Punching & Shearing	11	0.4	7	0.3	4	0.2
Non–NC Punching & Shearing	56	1.8	39	1.7	17	0.1
Hydraulic Presses	29	3.1	21	2.9	8	0.2
Other Presses	488	9.6	474	9.0	14	0.6
Draw Benches	106	2.2	9	0.3	97	1.9
Thread Rolling Machines	25	0.1	1	(a)	24	0.1
Wire Working Machines	85	4.7	45	2.9	40	1.9
Other Metal Forming Machines	193	3.1	110	1.8	83	1.4

(a) – less than $50,000 Source: Statistics Canada

BRAZIL IMPORTS AND EXPORTS OF MACHINE TOOLS

Selected Countries, 1984–1988

(millions of U.S. dollars)

	1984	1985	1986	1987	1988
TOTAL IMPORTS	$42.1	$36.8	$60.4	$120.1	na
Argentina	0.1	(a)	0.4	11.4	na
France	0.2	0.1	0.6	1.0	na
East Germany	(a)	1.4	0.5	0.6	na
Italy	16.3	2.0	5.4	13.3	na
Japan	2.7	3.1	9.5	13.6	na
Soviet Union	0.3	0.5	0.9	1.0	na
Spain	0.3	0.3	0.4	2.5	na
Sweden	0.1	0.1	0.2	3.7	na
Switzerland	1.0	2.9	7.1	5.8	na
United Kingdom	0.1	0.6	0.8	4.9	na
United States	13.3	9.3	9.0	18.7	na
West Germany	6.9	15.4	23.5	40.9	na
Other Countries	0.8	1.1	2.1	2.7	na
TOTAL EXPORTS	$20.3	$28.8	$26.3	$24.5	na
Argentina	0.6	1.3	0.6	1.4	na
Bolivia	0.4	0.3	0.8	0.5	na
Chile	0.4	0.3	0.6	0.5	na
Colombia	0.3	0.1	0.4	0.3	na
Indonesia	0.0	(a)	2.8	0.0	na
Iran	7.6	0.0	0.0	0.0	na
Mexico	2.9	1.7	0.8	6.0	na
Paraguay	(a)	0.5	1.7	1.2	na
Peru	(a)	0.2	0.2	0.6	na
United States	4.1	18.9	0.7	7.9	na
Venezuela	0.7	0.7	0.2	0.3	na
West Germany	1.5	2.5	15.5	2.5	na
Other Countries	1.8	2.3	2.0	3.3	na

(a) – less than $50,000 Source: United Nations Trade Data System

YUGOSLAVIA IMPORTS AND EXPORTS OF MACHINE TOOLS
Selected Countries, 1984–1988
(millions of U.S. dollars)

	1984	1985	1986	1987	1988
TOTAL IMPORTS	$153.6	$98.7	$120.1	$176.1	na
Austria	0.2	0.4	1.0	5.0	na
China	0.6	0.7	1.2	1.9	na
Czechoslovakia	15.4	16.8	10.0	13.9	na
East Germany	17.3	10.6	10.7	16.6	na
France	8.0	3.6	4.8	2.7	na
Hungary	1.7	2.6	2.6	2.9	na
Italy	8.8	4.3	9.1	16.1	na
Japan	1.3	0.6	4.1	4.8	na
Poland	3.5	2.4	2.3	1.9	na
Soviet Union	9.2	7.2	9.5	10.1	na
Sweden	0.1	2.7	1.8	2.7	na
Switzerland	11.8	5.6	10.5	16.3	na
United Kingdom	1.3	0.6	1.3	2.6	na
United States	0.7	1.0	3.3	2.5	na
West Germany	72.1	37.9	45.4	74.1	na
Other Countries	1.6	1.7	2.5	2.0	na
TOTAL EXPORTS	$110.0	$101.4	$136.5	$174.5	na
Belgium–Luxembourg	0.1	1.1	2.1	3.5	na
Czechoslovakia	18.2	8.3	7.2	6.7	na
East Germany	9.0	3.4	6.1	8.4	na
Hungary	2.6	2.7	2.9	3.8	na
Italy	0.6	0.6	0.5	1.6	na
Poland	6.2	2.9	3.4	2.9	na
Romania	1.0	1.1	2.2	1.7	na
Soviet Union	62.9	69.5	101.9	131.2	na
United States	2.2	5.1	2.6	2.9	na
West Germany	2.0	2.4	3.5	5.8	na
Other Countries	5.2	4.3	4.1	6.0	na

(a) – less than $50,000 Source: United Nations Trade Data System

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ACTUAL AND PROJECTED GNP AND OTHER ECONOMIC INDICATORS

		Actual			Projection
	Measure	1987	1988(r)	1989(p)	1990
Gross National Product	(billions dol.)	4,526.7	4,880.6	5,234.0	5,542.0
GNP in Constant Dollars	(bil. 1982 dol.)	3,847.0	4,024.4	4,144.1	4,224.1
GNP Implicit Price Deflator	(1982=100)	117.7	121.3	126.3	131.2
Industrial Production	(1977=100)	129.8	137.2	141.7	143.1
Unemployment Rate	(percent)	6.2	5.5	5.3	5.6
Corporate Profits After Taxes	(bil. 1982 dol.)	176.6	168.9	161.0	161.1
Non-Residential Fixed Investment	(bil. 1982 dol.)	445.1	493.8	510.3	527.0
Change in Business Inventories	(bil. 1982 dol.)	30.2	27.9	21.9	21.2
Personal Consumption Expenditures	(bil. 1982 dol.)	2,521.0	2,592.2	2,668.5	2,726.0
Federal Government Purchases	(bil. 1982 dol.)	339.0	328.8	337.2	334.5

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Tables 1.1, 1.2, 7.5; Economic Report of The President, 1989; Projected: American Statistical Association and National Bureau of Economic Research Panel of Forecasters, "Economic Outlook USA."

BUSINESS CYCLE REFERENCE DATES

1945 to Date

(in months)

Expansion	Duration	Recession	Duration
Oct. 1945 – Nov. 1948	37	Nov. 1948 – Oc.t. 1949	11
Oct. 1949 – July 1953	45(a)	July 1953 – May 1954	10
May 1954 – Aug. 1957	39	Aug. 1957 – Apr. 1958	8
Apr. 1958 – Apr. 1960	24	Apr. 1960 – Feb. 1961	10
Feb. 1961 – Dec. 1969	106(a)	Dec. 1969 – Nov. 1970	11
Nov. 1970 – Nov. 1973	36	Nov. 1973 – Mar. 1975	16
Mar. 1975 – Jan. 1980	58	Jan. 1980 – July 1980	6
July 1980 – July 1981	12	July 1981 – Nov. 1982	16
Nov. 1982 – Present			

(a) Wartime expansion. Source: National Bureau of Economic Research, Inc.

Notes: The historical business cycle turning dates, above, are those designated by the National Bureau of Economic Research, Inc. (NBER). They mark the approximate dates when, according to the NBER, aggregate economic activity reached its cyclical high (peak) or low (trough) levels. The current expansion started in November 1982 and as of July 1990 had reached a length of 92 months making it the second longest post–World War II expansion.

CANADIAN MACHINE TOOL IMPORTS 1989

By Type of Machine and Country of Origin

(millions of U.S. dollars)

	TOTAL	U.S.	Japan	W.Germ.	Taiwan	Switz.	U.K.	Italy	Others
TOTAL MACHINE TOOLS	$449.3	$197.2	$86.8	$57.6	$27.7	$9.9	$12.4	$14.4	$43.4
Laser, Photon Beam Processes	4.5	3.0	0.3	1.2	0.0	0.0	(a)	0.0	0.0
Ultrasonic Processes	0.4	0.2	0.1	0.0	(a)	0.0	0.0	(a)	0.0
Electrical–Discharge Machines	13.4	4.0	5.4	(a)	1.0	2.5	0.0	0.1	0.4
Electro–Chemical Plasma	4.1	4.0	0.0	0.1	0.0	0.0	0.0	(a)	0.0
Machining Centers	65.5	24.0	29.5	4.7	3.4	0.6	0.6	1.0	1.8
Single Stat. Unit Constuction	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Multi–Station Transfer	1.2	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0
NC Horizontal Lathes	53.7	13.1	21.5	10.1	2.3	2.3	1.2	0.6	2.5
Non–NC Horizontal Lathes	17.5	5.0	0.8	1.4	3.0	0.1	1.1	0.3	5.6
Other NC Lathes	3.4	1.4	1.0	0.2	0.1	0.0	0.3	0.5	0.0
Other Non–NC Lathes	3.7	1.8	0.1	(a)	0.6	0.0	0.3	0.2	0.6
Way–Type Unit Head Machines	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NC Drilling Machines	3.5	2.9	0.0	0.0	0.0	0.3	0.0	0.3	0.0
Non–NC Drilling Machines	13.1	4.8	0.0	0.3	4.4	0.1	0.4	0.3	2.8
NC Boring–Milling Machines	8.3	0.8	5.6	0.3	0.0	(a)	1.0	0.2	0.4
Non–NC Boring–Milling Machines	1.7	0.7	0.3	0.3	0.1	0.0	0.0	0.2	0.1
Other Boring Machines	12.9	3.5	4.0	3.9	0.4	0.1	0.1	0.5	0.4
NC Knee Type Milling	5.9	2.5	0.9	0.3	0.8	0.0	0.2	0.9	0.3
Non–NC Knee Type Milling	11.6	1.9	0.1	0.4	4.2	0.1	0.7	0.1	4.1
Other NC Milling Machines	7.3	4.9	0.5	0.9	0.3	0.0	0.0	0.5	0.2
Other Non–NC Milling	1.8	1.2	(a)	0.2	0.1	0.0	(a)	0.1	0.2
Threading & Tapping Machines	2.8	2.1	0.5	0.1	0.0	0.0	(a)	0.0	(a)

continued

CANADIAN MACHINE TOOL IMPORTS 1989
By Type of Machine and Country of Origin
(millions of U.S. dollars)

	TOTAL	U.S.	Japan	W.Germ.	Taiwan	Switz.	U.K.	Italy	Others
continued									
NC Flat Surface Grinding	2.0	1.5	0.0	0.2	0.0	0.0	0.0	0.2	0.0
Non–NC Flat Surf. Grinding	6.8	2.7	(a)	0.8	1.4	0.3	0.7	0.3	0.7
NC Tool or Cutter Grinding	3.4	0.9	0.0	0.4	0.0	0.2	1.5	0.2	0.2
Non–NC Tool or Cutter	5.8	2.7	0.1	0.8	1.1	1.2	0.2	0.3	0.4
Other NC Grinding Machines	14.4	8.3	0.2	5.2	0.0	0.1	(a)	0.4	0.2
Other Non–NC Grinding	12.4	5.6	0.2	1.4	0.5	0.2	0.2	1.0	1.4
Honing & Lapping Machines	1.0	0.9	0.0	0.4	0.0	0.0	0.0	0.0	0.1
Deburring, Polishing, etc.	8.6	3.8	0.2	1.8	1.4	(a)	0.2	0.9	0.4
Planing Machines	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shaping & Slotting Machines	0.8	0.6	0.0	0.2	0.0	0.0	0.0	0.0	(a)
Broaching Machines	2.2	2.0	0.0	0.1	(a)	0.0	(a)	0.0	0.0
Gear Cutting Machines	5.7	3.8	0.0	1.8	0.0	(a)	0.1	0.0	0.0
Sawing & Cut–Off Machines	17.4	9.0	1.3	4.0	1.4	0.0	0.5	0.5	0.6
Filing or Engraving Machines	3.7	3.0	0.1	0.3	(a)	0.1	(a)	0.1	0.2
Forging Machines	12.6	6.8	2.1	1.1	0.4	0.0	0.2	0.6	1.3
NC Bending, Folding, etc.	13.8	9.0	1.4	0.4	(a)	0.1	0.3	0.5	2.0
Non–NC Bend, Fold, etc.	15.2	10.9	0.2	0.1	0.4	(a)	0.4	0.6	2.5
NC Punching & Shearing	22.7	9.9	7.5	3.2	0.0	0.0	0.4	0.3	1.5
Non–NC Punch. & Shearing	13.6	9.4	0.2	0.6	0.1	0.1	0.9	0.6	1.8
Hydraulic Presses	17.9	5.7	0.5	2.8	0.2	0.0	0.0	(a)	8.7
Other Presses	10.4	7.1	1.0	1.8	(a)	(a)	0.0	0.3	0.2
Draw Benches	2.6	0.9	0.0	1.1	0.0	0.0	0.0	0.4	0.2
Thread Rolling Machines	0.6	0.5	0.0	0.0	0.0	0.0	(a)	0.0	0.1
Wire Working Machines	11.5	2.8	0.5	3.6	(a)	1.2	0.8	1.3	1.3
Other Metal Forming Machines	7.4	5.3	0.4	0.8	0.1	0.2	0.1	0.1	0.4

(a) – less than $50,000 Source: Statistics Canada

CANADIAN MACHINE TOOL IMPORTS 1988

By Type of Machine and Country of Origin

(millions of U.S. dollars)

	TOTAL	U.S.	Japan	W.Germ.	Taiwan	Switz	U.K.	Italy	Others
TOTAL MACHINE TOOLS	$495.3	$204.9	$131.8	$48.0	$21.2	$13.6	$15.6	$22.5	$37.6
Laser, Photon Beam Processes	7.0	5.4	1.0	0.4	0.0	(a)	(a)	(a)	0.1
Ultrasonic Processes	1.0	0.7	0.1	(a)	0.0	(a)	0.0	(a)	0.1
Electrical Discharge Machines	26.8	18.2	3.9	0.4	0.7	3.0	0.1	0.1	0.5
Electro–Chemical Plasma	2.4	2.2	(a)	(a)	0.0	(a)	(a)	(a)	0.1
Machining Centers	60.2	20.9	24.9	7.7	2.5	1.4	0.3	1.1	1.5
Single Stat. Unit Construction	0.2	0.1	0.0	0.0	0.0	(a)	(a)	0.0	(a)
Multi–Station Transfer	4.8	4.5	0.0	0.0	0.0	0.1	0.0	0.0	0.2
NC Horizontal Lathes	42.0	13.2	20.4	2.8	2.3	0.5	0.8	0.0	2.0
Non–NC Horizontal Lathes	17.9	6.3	0.6	1.9	2.5	1.3	2.2	0.4	2.8
Other NC Lathes	3.2	0.8	1.8	0.2	(a)	0.0	0.0	(a)	0.4
Other Non–NC Lathes	4.8	1.8	0.2	1.1	0.4	0.1	0.2	0.0	1.0
Way–Type Unit Head Machines	0.4	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0
NC Drilling Machines	3.3	1.8	0.6	0.7	0.0	0.0	0.2	0.0	0.0
Non–NC Drilling Machines	9.8	3.4	0.1	0.8	3.5	0.0	0.3	0.1	1.7
NC Boring–Milling Machines	4.5	0.9	1.2	0.2	0.0	0.0	1.7	0.3	0.1
Non–NC Boring–Milling Machines	3.5	2.0	0.6	0.1	(a)	0.0	0.2	(a)	0.4
Other Boring Machines	11.3	6.1	1.8	1.3	0.1	(a)	0.1	0.5	1.3
NC Knee Type Milling	4.6	1.7	1.4	0.2	0.1	0.1	0.3	0.0	0.7
Non–NC Knee Type Milling	12.9	2.2	1.1	1.0	3.1	(a)	0.9	(a)	4.5
Other NC Milling Machines	7.9	3.6	1.9	0.6	0.4	0.0	0.0	0.7	0.6
Other Non–NC Milling Machines	6.6	1.9	(a)	2.7	0.4	0.2	0.2	0.6	0.6
Threading & Tapping	4.5	2.6	0.6	0.6	0.1	(a)	(a)	0.0	0.6

continued

CANADIAN MACHINE TOOL IMPORTS 1988

By Type of Machine and Country of Origin

(millions of U.S. dollars)

continued	TOTAL	U.S.	Japan	W.Germ.	Taiwan	Switz	U.K.	Italy	Others
NC Flat Surface Grinding	4.1	2.3	0.0	0.1	0.0	0.5	0.9	0.3	(a)
Non–NC Flat Surf. Grinding	8.2	4.0	(a)	1.0	1.3	0.2	0.5	0.4	0.8
Other NC Grinding Machines	10.8	2.8	4.0	1.3	(a)	0.7	(a)	2.0	0.1
Other Non–NC Grinding Mach.	13.3	5.2	2.3	2.7	0.9	1.1	(a)	0.6	0.4
NC Tool or Cutter Grinding	1.1	0.7	(a)	(a)	0.0	0.3	0.0	(a)	(a)
Non–NC Tool or Cutter Grind.	5.3	2.1	(a)	1.1	0.1	0.3	0.5	0.3	0.9
Honing or Lapping Machines	2.7	2.0	0.1	0.3	0.0	0.0	0.3	(a)	(a)
Deburring, Polishing, etc.	7.3	4.5	0.4	0.6	0.7	0.0	0.3	0.3	0.4
Planing Machines	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shaping & Slotting Machines	1.7	1.3	(a)	0.0	0.0	0.0	0.0	0.1	0.2
Broaching Machines	1.1	0.8	0.0	0.3	(a)	0.0	0.0	0.0	0.0
Gear Cutting Machines	2.7	1.2	0.0	0.6	(a)	0.8	0.0	0.0	0.2
Sawing & Cut–Off Machines	17.7	8.1	0.8	4.7	1.5	0.0	1.6	0.6	0.5
Filing or Engraving Machines	4.4	3.2	0.3	0.1	(a)	0.1	(a)	0.1	0.6
Forging Machines	26.5	8.1	13.0	0.5	0.0	0.0	1.1	0.7	3.2
NC Bending, Folding, etc.	13.1	9.0	2.5	0.4	0.1	0.0	(a)	0.5	0.7
Non–NC Bend, Fold, etc.	16.5	11.1	0.5	0.5	0.2	0.1	0.8	1.4	2.1
NC Shearing Machines	3.8	1.5	0.2	0.1	0.0	0.1	0.4	1.1	0.6
Non–NC Shearing Machines	5.2	3.4	(a)	0.1	0.1	0.1	0.4	0.3	0.7
NC Punch/Notching Machines	15.4	5.2	7.1	0.9	(a)	0.0	0.4	(a)	1.7
Non–NC Punch/Notch Machines	8.5	6.0	0.5	0.3	0.0	0.0	0.3	0.8	0.7
Hydraulic Presses	41.8	5.2	27.4	6.1	0.0	0.0	(a)	1.9	1.1
Other Presses	24.8	7.3	9.7	0.4	0.2	0.7	0.1	5.0	1.5
Draw Benches	2.2	0.8	0.0	0.1	0.0	0.0	(a)	1.2	(a)
Thread Rolling Machines	1.8	1.1	0.1	0.0	0.0	0.0	(a)	0.1	0.5
Wire Working Machines	8.7	2.8	0.4	2.0	0.0	1.6	0.3	0.7	0.8
Other Metal Forming Machines	6.9	4.3	0.0	1.1	0.0	0.4	0.1	0.2	0.8

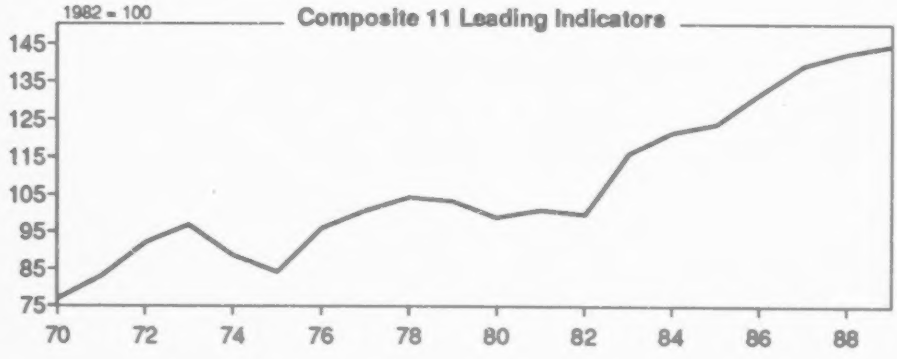
(a) – less than $50,000 Source: Statistics Canada

SELECTED LEADING BUSINESS CYCLE INDICATORS

(dollar values in billions of 1982 dollars)

Year	Composite 11 Leading Indicators 1982 = 100	Average Workweek, Mfg. Hours	New Orders Consumer Goods	Orders for Plant & Equipment	Net Change in Mfg's Unfilled Orders	% Change in Sensitive Prices
1970	77.2	39.8	$61.56	$20.47	$–3.03	–0.34%
1971	83.3	39.9	64.27	21.48	–1.12	0.18
1972	92.3	40.5	72.61	23.59	1.29	1.22
1973	97.2	40.7	80.89	29.25	5.13	2.23
1974	89.0	40.0	74.50	29.13	1.92	0.58
1975	84.5	39.5	63.96	22.03	–5.12	–0.66
1976	96.2	40.1	73.01	24.72	–0.85	1.20
1977	101.0	40.3	65.15	27.28	0.90	0.28
1978	104.6	40.4	85.18	31.70	3.74	0.87
1979	103.6	40.2	83.59	33.82	2.72	1.34
1980	99.2	39.7	74.26	29.97	–1.06	0.36
1981	101.2	39.8	73.96	29.28	–1.09	–0.11
1982	100.0	38.9	65.15	24.77	–2.34	–0.87
1983	116.2	40.1	75.21	27.03	1.13	1.09
1984	121.8	40.7	82.28	31.78	2.31	0.21
1985	124.0	40.5	84.60	32.68	0.03	–0.79
1986	132.1	40.7	80.71	34.17	–0.08	0.28
1987	139.6	41.0	84.69	37.61	1.37	1.09
1988(r)	142.8	41.1	87.20	45.10	1.83	0.45
1989(p)	144.9	41.0	87.85	48.17	2.01	0.09
1989 1st Qtr.	145.4	41.1	88.76	47.74	2.67	0.92
2nd Qtr.	144.7	41.1	88.12	47.20	2.47	0.48
3rd Qtr.	144.6	41.	87.02	47.79	1.63	–0.37
4th Qtr.	144.7	40.7	87.47	48.96	1.31	–0.67
1990 1st Qtr.	144.8	40.7	86.16	47.59	2.26	–1.03

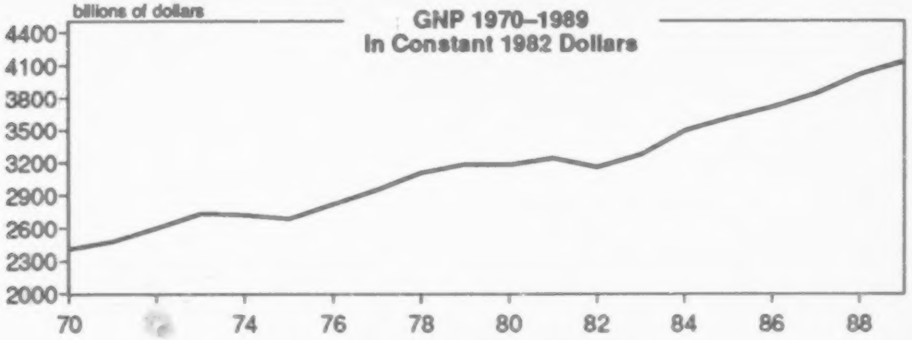
Source: U.S. Department of Commerce, Bureau of Economic Analysis, "Business Conditions Digest" (monthly).



GROSS NATIONAL PRODUCT AND COMPONENTS

Year	Gross National Product	Personal Consumption Expenditures	Gross Private Domestic Investment	Net Exports of Goods and Services	Government Purchases of Goods and Services
			Current Dollars (billions)		
1985	$4,014.9	$2,629.0	$643.1	$ -78.0	$ 820.8
1986	4,240.3	2,807.5	665.9	-104.4	871.2
1987	4,526.7	3,012.1	712.9	-123.0	924.7
1988(r)	4,880.6	3,235.1	750.3	-73.7	968.9
1989(p)	5,234.0	3,471.1	773.4	-47.1	1,036.6
			Constant 1982 Dollars (billions)		
1970	$2,416.2	$1,492.0	$381.5	$-30.0	$572.6
1971	2,484.8	1,538.8	419.3	-39.8	566.5
1972	2,608.5	1,621.9	465.4	-49.4	570.7
1973	2,744.1	1,689.6	520.8	31.5	565.3
1974	2,729.3	1,674.0	481.3	0.8	573.2
1975	2,695.0	1,711.9	383.3	18.9	580.9
1976	2,826.7	1,803.9	453.5	-11.0	580.3
1977	2,958.6	1,883.8	521.3	-35.5	589.1
1978	3,115.2	1,961.0	576.9	-26.8	604.1
1979	3,192.4	2,004.4	575.2	3.6	609.1
1980	3,187.1	2,000.4	509.3	57.0	620.5
1981	3,248.8	2,024.2	545.5	49.4	629.7
1982	3,166.0	2,050.7	447.3	26.3	641.7
1983	3,279.1	2,146.0	504.0	-19.9	649.0
1984	3,501.4	2,249.3	658.4	-84.0	677.7
1985	3,618.7	2,354.8	637.0	-104.3	731.2
1986	3,721.7	2,455.2	643.5	-137.5	760.5
1987	3,847.0	2,521.0	674.8	-128.9	780.2
1988(r)	4,024.4	2,598.4	715.8	-74.9	785.1
1989(p)	4,144.1	2,669.6	720.7	-52.6	806.4

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Tables 1.1 and 1.2



GNP 1970–1989
In Constant 1982 Dollars

CORPORATE PROFITS AND TAX

Year	Corporate Profits Before Taxes	Profits Tax Liability	Profits After Tax	Net Dividend Payments	Undistributed Profits
			Current Dollars (billions)		
1980	$234.6	$84.8	$149.8	$58.6	$91.2
1981	221.2	81.1	140.0	66.5	73.5
1982	169.5	63.1	106.5	66.9	39.6
1983	207.6	77.2	130.4	71.5	58.9
1984	240.0	93.9	146.1	79.0	67.0
1985	224.3	96.4	127.8	83.3	44.6
1986	236.4	106.6	129.8	88.2	41.6
1987	276.7	133.8	142.9	95.5	47.4
1988(r)	328.6	139.7	168.9	110.4	58.5
1989(p)	301.3	129.7	161.0	122.1	38.9

Source: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Table 1.14

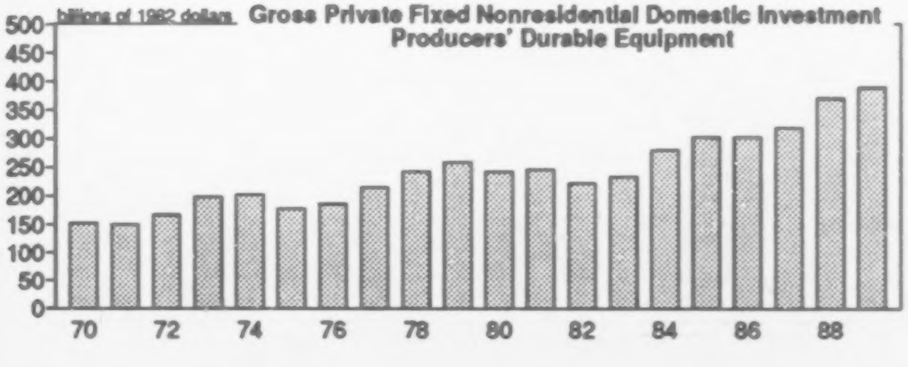
GROSS NATIONAL PRODUCT AND PRIVATE INVESTMENT

1970 to Date

		Gross Private Fixed Nonresidential Domestic Investment			
	Gross National	Total		Producers' Durable Equipment	
Year	Product	Billion $	% of GNP	Billion $	% of GNP
		Current Dollars (billions)			
1985	$4,014.9	$442.9	11.0%	$289.7	7.2%
1986	4,240.3	433.9	10.2	295.4	7.0
1987	4,526.7	446.8	9.9	307.3	6.8
1988(r)	4,880.6	487.2	10.0	346.8	7.1
1989(p)	5,234.0	511.7	9.8	366.7	7.0
		Constant 1982 Dollars (billions)			
1970	$2,416.2	$264.0	10.9%	$152.9	6.3%
1971	2,484.8	258.4	10.4	151.0	6.1
1972	2,608.5	277.0	10.6	167.5	6.4
1973	2,744.1	317.3	11.6	199.6	7.3
1974	2,729.3	317.8	11.6	202.7	7.4
1975	2,695.9	281.2	10.4	178.4	6.6
1976	2,826.7	290.6	10.3	186.2	6.6
1977	2,958.6	324.0	11.0	215.7	7.3
1978	3,115.2	362.1	11.6	242.8	7.8
1979	3,192.4	389.4	12.2	258.8	8.1
1980	3,187.1	379.2	11.9	243.0	7.6
1981	3,248.8	395.2	12.2	246.4	7.6
1982	3,166.0	366.7	11.6	223.4	7.1
1983	3,279.1	361.2	11.0	233.9	7.1
1984	3,501.4	425.2	12.1	281.4	8.0
1985	3,618.7	453.5	12.5	304.0	8.4
1986	3,721.7	433.1	11.6	303.8	8.2
1987	3,847.0	445.1	11.6	319.6	8.3
1988(r)	3,024.4	493.8	12.2	371.6	9.2
1989(p)	4,144.1	510.3	12.3	390.3	9.4

Sources: U.S. Department of Commerce, Bureau of Economic Analysis, NIPA Table 1.1 and 1.2.

Note: Gross private fixed nonresidential domestic investment includes capital expenditures by the domestic business sector for (1) new and replacement construction (e.g., buildings, stores, and warehouses) and (2) producers' durable equipment. Expenditures for producers' durable equipment include the new and replacement purchases of automobiles, trucks, various types of machinery, and other equipment used by the private sector in the production of goods and services.

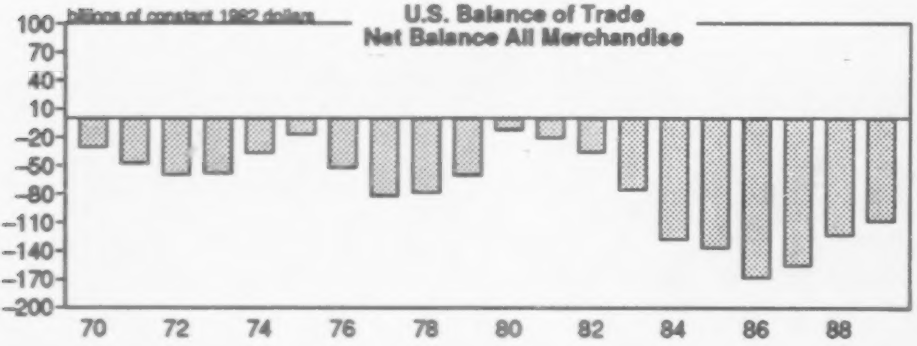


U.S. BALANCE OF TRADE

1970 to Date

Year	All Merchandise			Capital Goods, except Autos		
	Exports	Imports	Net Balance	Exports	Imports	Net Balance
Current Dollars (billions)						
1985	$220.8	$340.9	$–120.1	$ 76.5	$ 61.4	$15.1
1986	224.4	368.7	–144.3	79.3	72.1	7.2
1987(r)	255.1	412.4	–157.3	87.7	85.1	2.6
1988(r)	322.0	449.0	–127.0	112.4	101.8	10.6
1989(p)	368.9	480.2	–111.3	130.6	113.4	17.2
Constant 1982 Dollars (billions)						
1970	$120.6	$150.9	$–30.3	$ 35.9	$ 8.7	$27.2
1971	119.3	166.2	–46.9	36.8	8.5	28.3
1972	131.3	190.7	–59.4	39.7	10.9	28.8
1973	160.6	218.2	–57.6	50.3	13.5	36.8
1974	175.8	211.8	–36.0	61.9	14.4	47.5
1975	171.5	187.9	–16.4	62.7	13.5	49.2
1976	177.5	229.3	–51.8	61.1	16.2	44.9
1977	178.1	259.4	–81.3	58.8	17.2	41.6
1978	196.2	274.1	–77.9	64.6	22.3	42.3
1979	218.2	277.9	–59.7	76.3	27.4	48.9
1980	241.8	253.6	–11.8	87.1	31.2	55.9
1981	238.5	258.7	–20.2	86.6	36.8	49.8
1982	214.0	249.5	–35.5	73.7	38.3	35.4
1983	207.6	282.2	–74.6	70.8	45.7	25.1
1984	223.8	351.1	–127.3	78.6	69.3	9.3
1985	231.6	367.9	–136.3	85.8	73.1	12.7
1986	245.9	413.7	–167.8	94.1	84.1	10.0
1987	265.7	440.5	–154.8	112.6	102.1	10.5
1988(r)	344.3	467.1	–122.8	144.3	121.2	23.1
1989(p)	386.8	494.4	–107.6	162.3	140.8	21.5

Source: NIPA Tables 4.3 and 4.4.



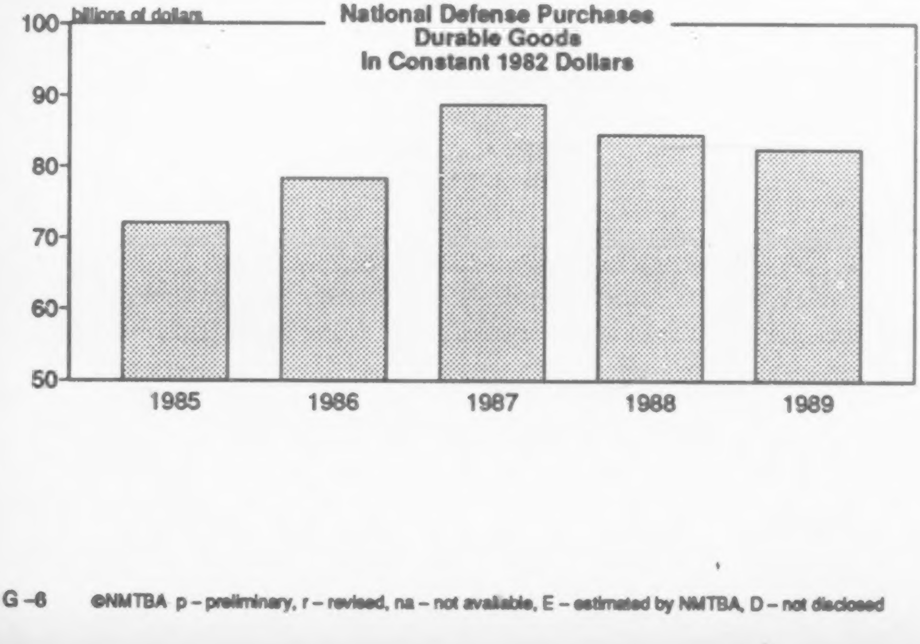
©NMTBA p – preliminary, r – revised, na – not available, E – estimated by NMTBA, D – not disclosed

NATIONAL DEFENSE PURCHASES OF DURABLE GOODS

1985 to Date

Category	1985	1986	1987	1988	1989
			Current Dollars (billions)		
National Defense Purchases	$259.1	$277.8	$294.8	$298.0	$302.2
Durable Goods	76.4	83.3	89.8	83.9	82.1
Military Equipment	64.5	71.1	77.5	72.9	72.1
Aircraft	26.6	33.0	33.9	29.3	26.7
Missiles	9.6	11.4	12.7	12.4	13.6
Ships	8.4	8.5	8.5	8.4	9.9
Vehicles	4.8	4.7	4.8	4.2	3.5
Electronic Equipment	4.9	5.1	5.8	6.0	6.3
Other	10.1	8.4	11.7	12.5	12.1
Other Durable Goods	11.9	12.2	12.3	11.0	9.9
			Constant 1982 Dollars (billions)		
National Defense Purchases	$237.2	$252.1	$265.2	$261.5	$256.5
Durable Goods	72.1	78.4	88.8	84.6	82.5
Military Equipment	59.1	64.1	73.3	70.8	69.6
Aircraft	22.8	27.9	31.6	29.0	27.0
Missiles	9.0	11.0	12.8	13.5	14.9
Ships	7.6	7.5	7.4	7.1	7.9
Vehicles	5.3	5.0	5.1	4.5	3.7
Electronic Equipment	4.7	4.8	5.5	5.6	5.7
Other	9.7	8.0	10.9	11.2	10.5
Other Durable Goods	13.0	14.3	15.5	13.8	12.8

Source: U. S. Department of Commerce, Bureau of Economic Analysis NIPA Tables 3.9 and 3.10



THE FEDERAL BUDGET

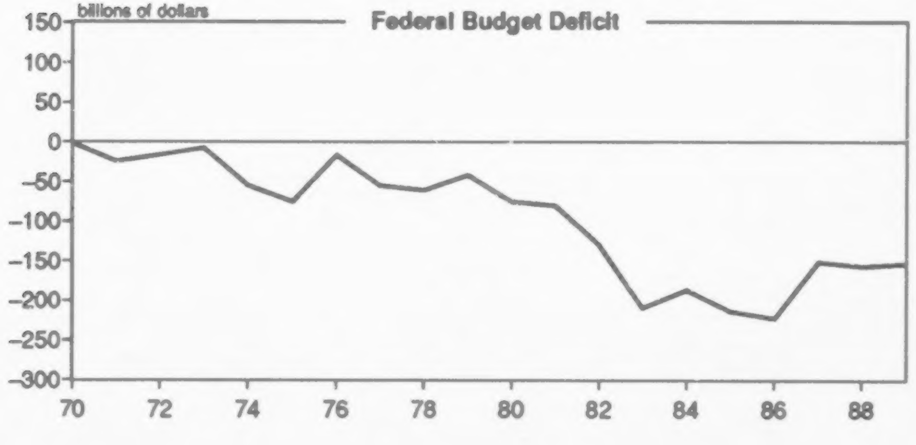
Fiscal Years, 1970 to Date

(billions of dollars)

Year	Receipts	Outlay	Surplus or Deficit (–)
1970	$ 192.8	$ 195.6	$ –2.8
1971	187.1	210.2	–23.0
1972	207.3	230.7	–23.4
1973	230.8	245.7	–14.9
1974	263.2	269.4	–6.1
1975	279.1	332.3	–53.2
1976	298.1	371.8	–73.7
Tr. Qtr.	81.2	96.0	–14.7
1977	355.6	409.2	–53.6
1978	399.6	458.7	–59.2
1979	463.3	503.5	–40.2
1980	517.1	590.9	–73.8
1981	599.3	678.2	–78.9
1982	617.8	745.7	–127.9
1983	600.6	808.3	–207.8
1984	666.5	851.8	–185.3
1985	734.1	946.3	–212.3
1986	769.1	990.3	–221.2
1987	854.1	1,003.8	–149.7
1988	909.0	1,064.0	–155.1
1989(p)	990.7	1,137.0	–152.0

Source: "Economic Report of the President," February, 1990.

Note: Tr. Qtr.– Transition Quarter: Beginning with the 1977 Federal Budget, the fiscal year runs from October 1 through September 30. To facilitate the conversion, a three–month transition period was provided between fiscal years 1976 and 1977.



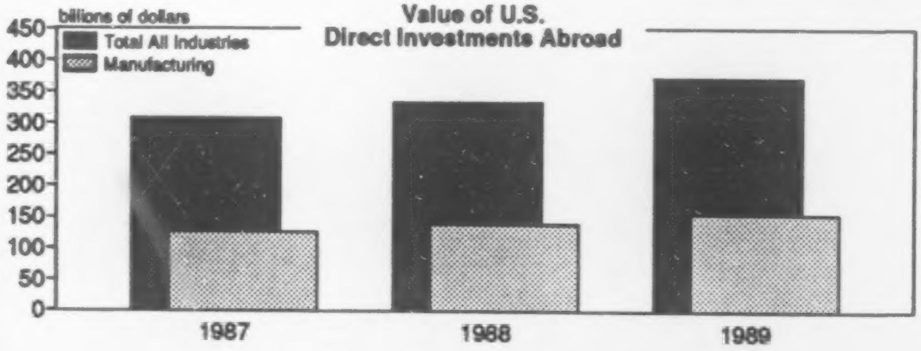
VALUE OF UNITED STATES DIRECT INVESTMENTS ABROAD

Book Value at Year End, 1987 to Date

(millions of U.S. dollars)

	Total All Industries			Manufacturing		
	1987	1988 (r)	1989 (p)	1987	1988 (r)	1989 (p)
World	$307,983	$333,501	$373,436	$127,074	$139,584	$155,704
Canada	58,377	62,610	66,856	26,782	28,859	32,333
Europe	146,243	156,932	176,736	67,424	71,072	77,846
EC (12)	120,066	131,115	149,975	64,659	68,252	74,893
France	11,771	13,150	14,747	8,060	8,749	9,490
Germany	24,792	21,742	23,059	16,182	14,018	14,430
Ireland	5,135	6,212	6,237	3,796	4,553	5,082
Italy	9,008	9,540	10,634	6,444	6,933	6,830
Netherlands	14,361	16,017	17,168	6,118	6,163	7,541
Spain	3,789	4,979	6,002	2,288	3,040	3,865
UK	42,031	49,274	60,810	17,668	19,379	22,097
Other EC	9,179	10,201	11,318	4,103	5,417	5,558
Other Europe	26,177	25,817	26,761	2,765	2,819	2,953
Japan	14,671	17,927	19,341	7,136	8,941	9,959
Australia, New Zealand & S. Africa	13,399	15,288	16,377	4,262	5,276	6,331
Australia	11,143	13,186	14,495	3,313	4,557	5,771
New Zealand & S. Africa	2,256	2,102	1,882	949	719	560
Latin America & Other W. Hemisphere	44,905	51,041	61,364	15,768	18,702	21,285
South America	20,690	21,690	23,557	11,106	13,044	14,427
Brazil	10,288	12,460	14,687	7,842	9,544	11,023
Other South America	10,402	9,230	8,870	3,264	3,500	3,404
Cental America	11,657	13,139	15,880	4,445	5,409	6,600
Mexico	4,898	5,694	7,079	3,911	4,776	5,837
Other Central America	6,759	7,445	8,801	534	633	763
Other W. Hemisphere	12,558	16,232	21,928	217	248	258
Other Africa	4,488	4,199	4,310	296	344	452
Middle East	4,589	3,806	3,886	388	435	775
Other Asia and Pacific	16,694	18,515	20,991	5,017	5,957	6,723

Source: U.S. Department of Commerce, "Survey of Current Business," (June).



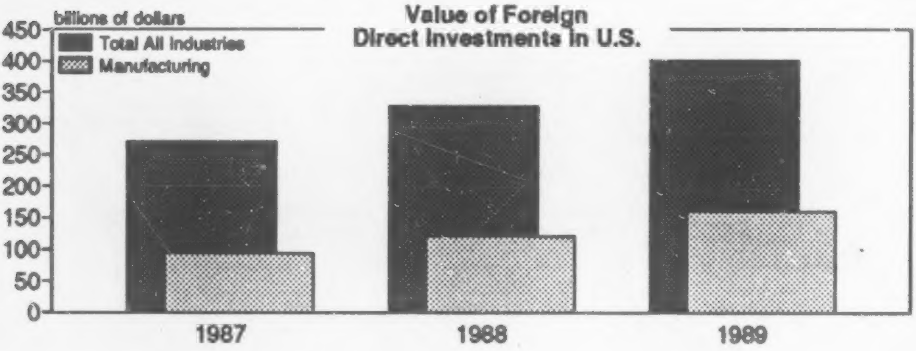
VALUE OF FOREIGN DIRECT INVESTMENT IN THE UNITED STATES

Book Value at Year End, 1987 to date

(millions of U.S. dollars)

	Total All Industries			Manufacturing		
	1987	1988	1989	1987	1988	1989
World	$271,788	$328,850	$400,817	$94,745	$121,434	$160,216
Canada	24,013	27,361	31,538	7,636	9,391	11,586
Europe	186,076	216,418	262,011	73,981	91,932	121,633
EC (12)	165,427	193,912	234,794	62,400	79,525	106,411
France	10,119	11,364	16,375	8,567	9,908	13,916
Germany	20,315	23,845	28,223	9,294	13,268	15,232
Netherlands	49,115	48,991	60,483	16,137	17,153	24,101
UK	79,669	101,909	119,137	27,061	37,021	50,704
Other EC	6,209	7,793	10,576	1,341	2,175	2,458
Other Europe	20,649	22,505	27,217	11,580	12,407	15,221
Sweden	4,953	5,263	4,925	3,133	3,618	3,557
Switzerland	14,686	15,896	19,329	7,996	8,072	10,107
Other	1,010	1,346	2,963	451	717	1,557
Japan	35,151	53,354	69,699	5,345	12,222	17,255
Australia, New Zealand & S. Africa	6,552	5,624	6,532	3,040	2,279	3,396
Latin America, & Other W. Hemisphere	12,671	17,019	20,348	3,556	4,221	4,230
So. and Central America	4,394	4,978	5,915	484	406	541
Other W. Hemisphere	8,277	12,040	14,432	3,072	3,815	3,689
Neth. Antilles	9,317	10,591	10,570	2,345	3,118	2,786
Other	–1,040	1,449	3,862	727	697	903
Middle East	4,996	5,831	6,425	263	281	416
Other Africa, Asia & Pacific	2,325	3,243	4,263	924	1,109	1,701

Source: U.S. Department of Commerce, "Survey of Current Business," (June).

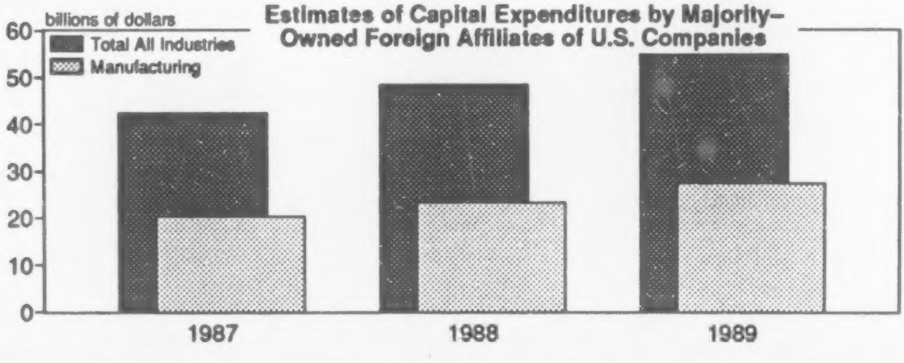


ESTIMATES OF CAPITAL EXPENDITURES
by Majority–Owned Foreign Affiliates of U.S. Companies
(millions of U.S. dollars)

	Total All Industries			Manufacturing		
	1988(r)	1989(p)	1990 (E)	1988(r)	1989(p)	1990 (E)
World	$42,562	$48,443	$54,895	$20,403	$23,416	$27,363
Canada	7,936	8,689	9,500	3,403	4,260	4,751
Europe	21,527	23,346	27,444	11,318	12,423	14,738
EC (12)	19,762	21,397	25,192	11,083	12,127	14,376
Belgium	895	989	1,357	735	777	1,105
France	2,388	2,366	2,835	1,575	1,370	1,628
Germany	3,922	3,860	4,786	2,929	2,919	3,711
Italy	1,161	1,384	1,748	767	919	960
Netherlands	1,185	1,374	1,513	808	908	959
Spain	795	1,066	1,145	666	883	939
United Kingdom	8,643	9,499	10,697	3,073	3,784	4,321
Other EC	773	859	1,111	530	567	753
Other Europe	1,765	1,949	2,252	236	296	361
Japan	1,801	2,230	2,430	1,216	1,643	1,751
Australia, New Zealand & S. Africa	2,612	3,063	2,919	1,050	1,119	1,371
Australia	2,290	2,729	2,637	978	1,043	1,248
New Zealand & S. Africa	323	334	282	72	77	123
Latin America and Other Western Hemisphere	3,623	4,703	5,121	2,266	2,768	3,349
South America	2,604	3,197	3,682	1,699	1,986	2,414
Brazil	1,623	1,977	2,297	1,255	1,509	1,841
Other South America	981	1,220	1,385	444	477	573
Central America	714	984	1,129	527	745	894
Mexico	593	841	975	491	701	829
Other Central America	121	143	154	36	44	65
Other Western Hemisphere	305	523	310	39	38	41
Other Africa	920	1,043	1,096	60	57	50
Middle East	410	485	603	36	38	38
Other Asia and Pacific	3,036	3,970	4,902	1,054	1,107	1,371

Source: U.S. Department of Commerce, "Survey of Current Business" (March).

Note: "Capital expenditures" previously were referred to as "property, plant, and equipment expenditures." They represent gross outlays charged to capital accounts to acquire, add to, or improve real property, plant, and equipment. Sales or other dispositions of fixed assets are not netted against these outlays.



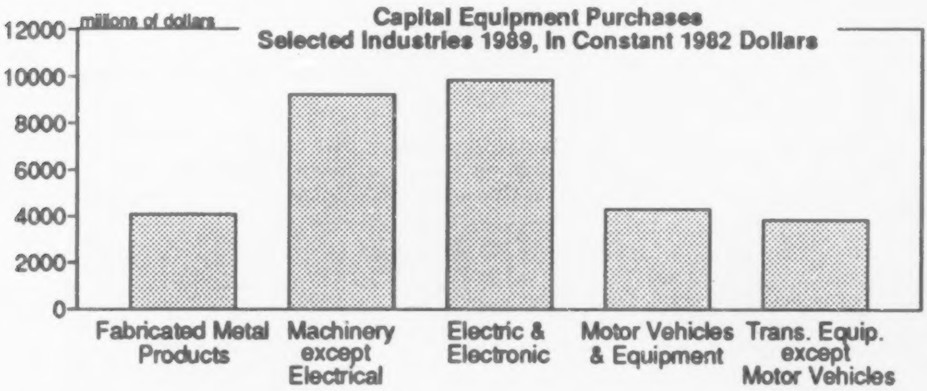
Estimates of Capital Expenditures by Majority–Owned Foreign Affiliates of U.S. Companies

CAPITAL EQUIPMENT PURCHASES OF SELECTED INDUSTRIES

1970 to Date

Year	Fabricated Metal Products	Machinery except Electrical	Electric and Electronic Equipment	Motor Vehicles and Equipment	Transportation Equip., except Motor Vehicles
			Current Dollars (millions)		
1985	$3,534	$6,914	$9,009	$5,459	$3,200
1986	3,763	5,472	7,673	5,702	3,541
1987	3,792	5,678	8,221	4,714	3,428
1988	3,969	6,143	10,119	4,212	3,336
1989	4,586	6,322	10,000	4,802	3,809
			Constant 1982 Dollars (millions)		
1970	$2,498	$2,572	$2,727	$4,327	$1,125
1971	2,161	2,314	2,504	4,387	815
1972	2,462	2,493	2,965	4,453	1,121
1973	3,257	3,335	3,726	3,914	1,245
1974	3,277	4,116	4,105	4,727	1,473
1975	2,983	3,746	2,648	3,217	1,483
1976	2,961	3,588	2,918	3,525	1,664
1977	3,460	4,516	3,298	4,795	1,497
1978	3,736	5,633	4,365	6,284	2,047
1979	3,793	6,409	5,185	6,172	2,185
1980	4,011	7,334	6,380	6,121	2,470
1981	4,160	7,317	6,085	8,359	2,440
1982	2,445	7,083	6,367	3,639	2,193
1983	2,257	5,969	6,547	1,953	1,991
1984	3,093	7,305	8,793	3,929	2,869
1985	3,494	8,999	9,621	5,452	3,429
1986	3,582	7,326	8,090	5,475	3,720
1987	3,505	7,725	8,406	4,387	3,527
1988	3,578	8,452	10,036	3,820	3,354
1989	4,085	9,234	9,869	4,311	3,868

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

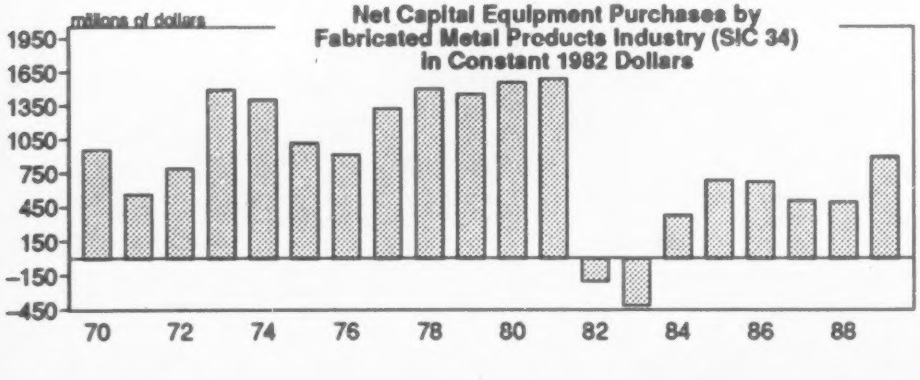


Capital Equipment Purchases
Selected Industries 1989, In Constant 1982 Dollars

CAPITAL EQUIPMENT PURCHASES BY
The Fabricated Metal Products Industry (SIC 34)

Year	Gross Investment	Capital Cost Allowance with Consumption Adjustment	Net Investment
		Current Dollars (millions)	
1985	$3,534	$2,892	$642
1986	3,763	3,107	656
1987	3,792	3,285	507
1988	3,969	3,453	516
1989	4,586	3,646	940
		Constant 1982 Dollars (millions)	
1970	$2,498	$1,537	$ 961
1971	2,161	1,599	562
1972	2,462	1,669	793
1973	3,257	1,762	1,495
1974	3,277	1,869	1,408
1975	2,983	1,962	1,021
1976	2,961	2,042	919
1977	3,460	2,131	1,329
1978	3,736	2,234	1,502
1979	3,793	2,341	1,452
1980	4,011	2,451	1,560
1981	4,160	2,567	1,593
1982	2,445	2,664	–199
1983	2,257	2,672	–415
1984	3,093	2,718	375
1985	3,494	2,807	687
1986	3,582	2,906	676
1987	3,505	2,997	508
1988	3,578	3,085	493
1989	4,085	3,187	898

Note: Capital Cost Allowance reflects changes in stock due to depreciation.

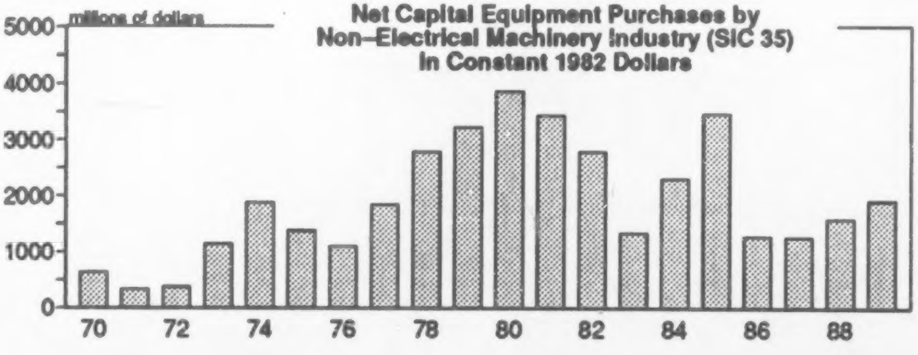

Net Capital Equipment Purchases by Fabricated Metal Products Industry (SIC 34) in Constant 1982 Dollars

CAPITAL EQUIPMENT PURCHASES BY
Non–Electrical Machinery Industry (SIC 35)

Year	Gross Investment	Capital Cost Allowance with Consumption Adjustment	Net Investment
		Current Dollars (millions)	
1985	$6,914	$4,623	$2,291
1986	5,472	4,882	590
1987	5,678	5,079	599
1988	6,143	5,256	887
1989	6,322	5,498	824
		Constant 1982 Dollars (millions)	
1970	$2,572	$1,933	639
1971	2,314	1,986	328
1972	2,493	2,122	371
1973	3,335	2,193	1,142
1974	4,116	2,228	1,888
1975	3,746	2,364	1,382
1976	3,588	2,486	1,102
1977	4,516	2,673	1,843
1978	5,633	2,843	2,790
1979	6,409	3,180	3,229
1980	7,334	3,465	3,869
1981	7,317	3,877	3,440
1982	7,083	4,285	2,798
1983	5,969	4,633	1,336
1984	7,305	4,999	2,306
1985	8,999	5,531	3,468
1986	7,326	6,051	1,275
1987	7,725	6,457	1,268
1988	8,452	6,869	1,583
1989	9,234	7,316	1,918

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Note: Capital Cost Allowance reflects changes in stock due to depreciation.

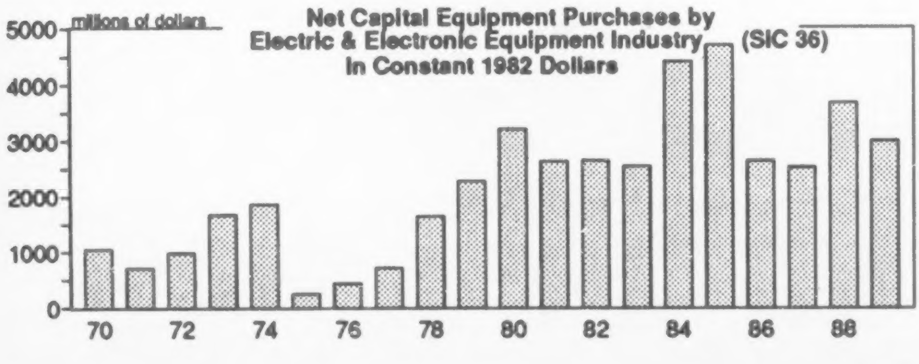


CAPITAL EQUIPMENT PURCHASES BY
The Electric and Electronic Equipment Industry (SIC 36)

Year	Gross Investment	Capital Cost Allowance with Consumption Adjustment	Net Investment
		Current Dollars (millions)	
1985	$9,009	4,806	4,203
1986	7,673	5,317	2,356
1987	8,221	5,766	2,455
1988	10,119	6,262	3,857
1989	10,000	6,836	3,164
		Constant 1982 Dollars (millions)	
1970	$2,727	$1,672	$1,055
1971	2,504	1,785	719
1972	2,965	1,978	987
1973	3,726	2,053	1,673
1974	4,105	2,243	1,862
1975	2,648	2,388	260
1976	2,918	2,478	440
1977	3,298	2,580	718
1978	4,365	2,720	1,645
1979	5,185	2,913	2,272
1980	6,380	3,167	3,213
1981	6,085	3,444	2,641
1982	6,367	3,714	2,653
1983	6,547	4,000	2,547
1984	8,793	4,380	4,413
1985	9,621	4,917	4,704
1986	8,090	5,439	2,651
1987	8,406	5,874	2,532
1988	10,036	6,352	3,684
1989	9,869	6,861	3,008

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Note: Capital Cost Allowance reflects changes in stock due to depreciation.

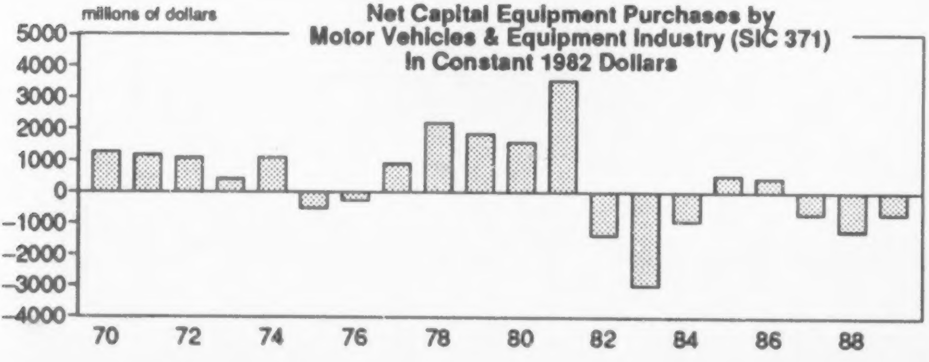


CAPITAL EQUIPMENT PURCHASES BY
The Motor Vehicles and Equipment Industry (SIC 371)

Year	Gross Investment	Capital Cost Allowance with Consumption Adjustment	Net Investment
		Current Dollars (millions)	
1985	$5,459	$5,047	$ 412
1986	5,702	5,369	333
1987	4,714	5,562	–848
1988	4,212	5,645	–1,433
1989	4,802	5,725	–923
		Constant 1982 Dollars (millions)	
1970	$4,327	$3,054	$1,273
1971	4,387	3,207	1,180
1972	4,453	3,364	1,089
1973	3,914	3,498	416
1974	4,727	3,634	1,093
1975	3,217	3,737	–520
1976	3,525	3,785	–260
1977	4,795	3,884	911
1978	6,284	4,078	2,206
1979	6,172	4,311	1,861
1980	6,121	4,525	1,596
1981	8,359	4,817	3,542
1982	3,639	5,004	–1,365
1983	1,953	4,925	–2,972
1984	3,929	4,850	–921
1985	5,452	4,914	538
1986	5,475	5,030	445
1987	4,387	5,075	–688
1988	3,820	5,039	–1,219
1989	4,311	4,992	–681

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Note: Capital Cost Allowance reflects changes in stock due to depreciation.

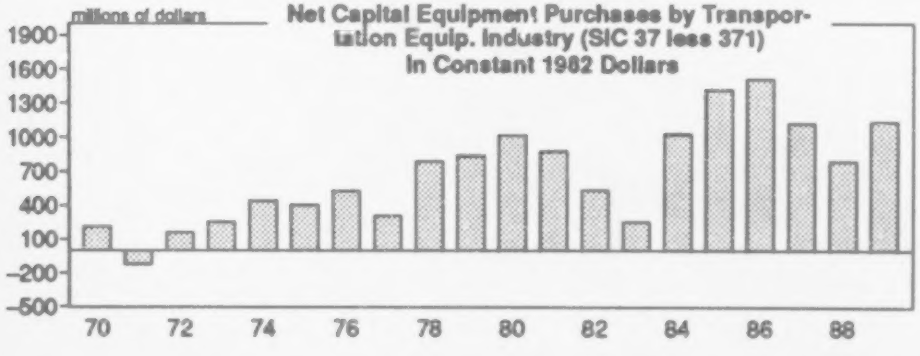


CAPITAL EQUIPMENT PURCHASES BY
The Transportation Equipment Industry (SIC 37 LESS 371)
Except for Motor Vehicles and Equipment

Year	Gross Investment	Capital Cost Allowance with Consumption Adjustment	Net Investment
		Current Dollars (millions)	
1985	$3,200	$1,969	$1,231
1986	3,541	2,188	1,353
1987	3,428	2,387	1,041
1988	3,336	2,558	778
1989	3,809	2,747	1,062
		Constant 1982 Dollars (millions)	
1970	$1,125	$913	$212
1971	815	934	−119
1972	1,121	954	167
1973	1,245	986	259
1974	1,473	1,027	446
1975	1,483	1,076	407
1976	1,664	1,131	533
1977	1,497	1,185	312
1978	2,047	1,253	794
1979	2,185	1,344	841
1980	2,470	1,447	1,023
1981	2,440	1,558	882
1982	2,193	1,656	537
1983	1,991	1,734	257
1984	2,869	1,836	1,033
1985	3,429	2,004	1,425
1986	3,720	2,204	1,516
1987	3,527	2,395	1,132
1988	3,354	2,559	795
1989	3,868	2,727	1,141

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Note: Capital Cost Allowance reflects changes in stock due to depreciation.



INTEREST RATES CHARGED BY BANKS ON BUSINESS LOANS

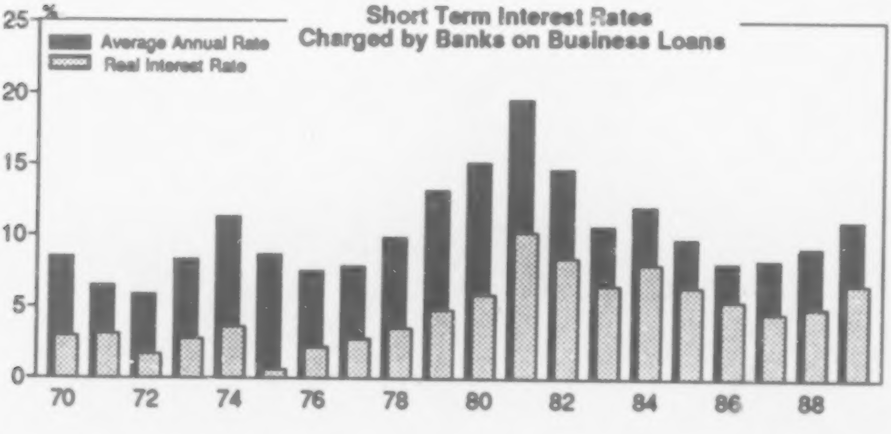
Short–term Rates, 1970 to Date

(Percent per Annum)

Year	Average Annual Rate	Real Interest Rate	February	May	August	November
1970	8.48%	2.95%	8.86%	8.49%	8.50%	8.07%
1971	6.48	3.09	6.59	6.01	6.51	6.18
1972	5.82	1.68	5.52	5.58	5.84	6.33
1973	8.30	2.73	6.52	7.35	9.24	10.08
1974	11.28	3.56	9.91	11.15	12.40	11.64
1975	8.65	0.61	9.94	8.16	8.22	8.29
1976	7.52	2.18	7.54	7.44	7.80	7.28
1977	7.85	2.78	7.48	7.37	7.87	8.66
1978	9.84	3.55	8.95	9.01	9.97	11.44
1979	13.18	4.79	12.27	12.34	12.31	15.81
1980	15.17	5.91	15.67	17.75	11.56	15.70
1981	19.56	10.27	19.91	19.99	21.11	17.23
1982	14.89	8.42	17.13	17.11	13.27	11.26
1983	10.84	6.54	10.20	10.31	11.09	10.95
1984	12.02	7.99	11.06	12.45	13.29	11.29
1985	9.74	6.42	10.10	9.90r	9.27	9.68
1986	8.11	5.43	9.29	8.13	7.73	7.28
1987	8.29	4.63	7.84	8.66	8.20	8.47
1988	9.18	4.98	8.37	8.49	9.75	10.11
1989	11.04	5.81	10.97	11.89	10.78	10.50

Source: Federal Reserve Board, NIPA Table 7.4.

Note: Real interest rates measure the after inflation cost of borrowing. We have used the Implicit GNP Deflator as our measure of inflation since it is the broadest measure of inflation and is less likely to be distorted by a large increase in a sensitive area.



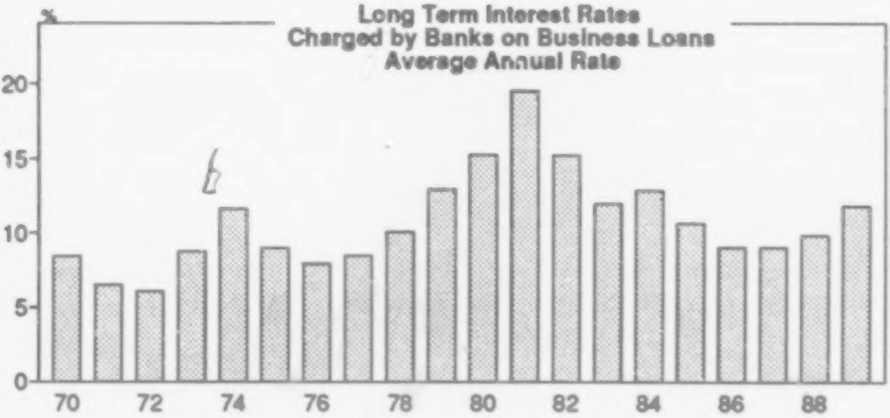
INTEREST RATES CHARGED BY BANKS ON BUSINESS LOANS

Long–term Rates, 1970 to Date

(Percent per Annum)

Year	Average Annual Rate	February	May	August	November
1970	8.47	8.67%	8.25%	8.66%	8.31%
1971	6.57	6.82	6.36	6.67	6.44
1972	6.12	5.64	5.87	6.31	6.67
1973	8.83	7.12	7.67	9.85	10.68
1974	11.70	10.16	11.41	13.08	12.16
1975	9.06	10.26	8.22	8.89	8.88
1976	7.99	8.02	8.02	8.45	7.48
1977	8.52	9.05	8.24	8.09	8.71
1978	10.11	9.19	9.67	10.20	11.38
1979	12.98	12.01	12.08	12.25	15.56
1980	15.32	15.79	18.37	12.06	15.07
1981	19.52	19.26	19.25	20.62	18.94
1982	15.25	16.59	16.96	15.22	12.24
1983	12.01	11.81	11.46	11.83	12.94
1984	12.89	11.92	13.12	13.81	12.69
1985	10.72	11.10	11.03	10.44	10.31
1986	9.08	10.26	9.07	8.73	8.24
1987	9.11	9.14	9.44	8.78	9.09
1988	9.92	9.41	9.05	10.44	10.79
1989	11.87	11.71	12.76	11.64	11.38

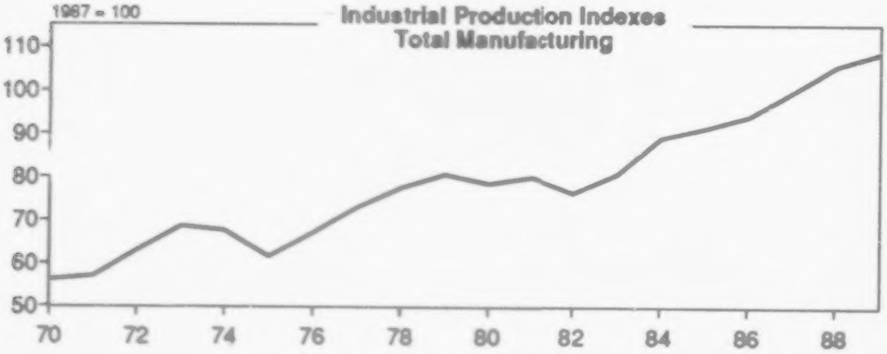
Source: Federal Reserve Board.



INDUSTRIAL PRODUCTION INDEXES
1970 to Date
(Seasonally Adjusted, 1987 = 100)

Year	Total Mfg.	Total Durables	Electrical Machinery	Machinery, Except Electrical	Motor Vehicles	Primary Metals	Fabricated Metals
1970	56.4	53.3	40.5	32.8	53.3	115.2	75.9
1971	57.3	53.1	40.7	30.5	66.9	109.2	75.6
1972	63.3	59.3	46.5	35.4	73.0	122.4	82.9
1973	68.9	66.2	53.0	41.4	85.0	138.9	92.1
1974	67.9	64.8	52.4	44.1	73.4	134.5	88.4
1975	61.1	56.7	45.1	38.1	62.2	107.2	76.7
1976	67.4	62.6	50.7	40.0	81.9	119.9	84.9
1977	73.3	68.7	58.4	45.1	94.7	121.5	92.7
1978	77.8	73.9	64.0	50.2	99.2	130.7	96.2
1979	80.9	78.3	71.3	56.9	91.0	133.0	99.5
1980	78.8	75.7	73.3	60.6	67.0	110.8	92.5
1981	80.3	77.4	75.4	65.9	64.4	117.5	91.1
1982	76.6	72.7	75.9	63.9	58.8	83.2	83.2
1983	80.9	76.8	80.3	64.3	74.5	91.0	85.5
1984	89.3	88.4	94.1	80.8	90.6	102.4	93.3
1985	91.6	91.8	93.1	86.8	99.0	101.8	94.5
1986	94.3	93.9	94.3	90.4	98.5	93.8	93.8
1987	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1988	105.8	107.6	106.5	113.8	105.5	110.3	106.2
1989	108.9	110.9	109.5	121.8	104.9	109.2	107.2
1989 1st Qtr.	108.6	110.8	108.6	120.6	110.3	111.9	108.0
2nd Qtr.	109.3	111.6	109.3	122.3	107.1	109.5	107.7
3rd Qtr.	108.9	111.1	110.0	122.3	101.8	110.1	106.7
4th Qtr.	108.7	110.0	110.1	121.9	99.1	105.3	106.4
1990 1st Qtr.	109.2	110.3	111.1	123.6	91.7	106.1	105.3

Source: Federal Reserve Board.

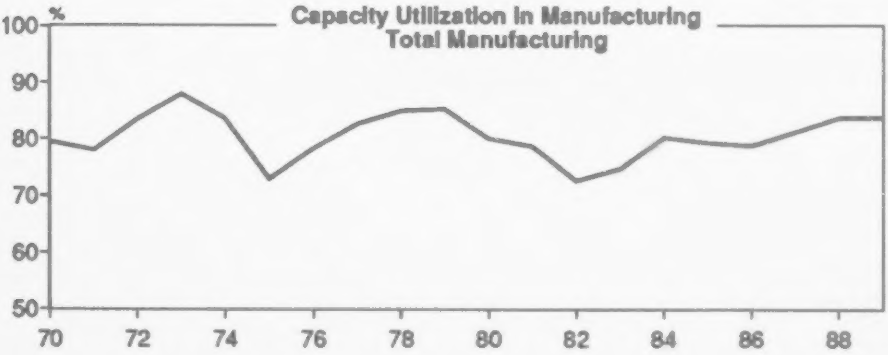


CAPACITY UTILIZATION IN MANUFACTURING

1970 to Date

Year	Total Mfg.	Total Durables	Electrical Machinery	Machinery, Except Electrical	Motor Vehicles	Primary Metals	Fabricated Metals
1970	79.7%	76.7%	75.7%	81.6%	66.7%	81.2%	75.0%
1971	78.2	74.3	72.4	73.3	79.6	75.1	73.7
1972	83.7	80.9	79.7	82.8	82.6	84.0	79.9
1973	88.1	87.5	86.6	93.4	91.5	94.0	86.8
1974	83.8	82.7	80.6	94.9	76.2	91.2	80.9
1975	73.2	70.2	66.1	78.6	62.8	72.1	68.6
1976	78.5	75.4	71.9	78.9	79.6	79.4	74.6
1977	82.8	80.3	79.7	84.4	88.9	79.7	79.8
1978	85.1	83.5	83.2	87.6	89.6	86.9	80.8
1979	85.4	84.9	87.6	90.7	79.2	87.9	82.0
1980	80.2	78.6	84.7	86.2	57.8	73.6	75.1
1981	78.8	76.6	81.3	82.5	56.5	77.9	72.6
1982	72.8	69.0	76.4	71.7	52.5	55.4	65.8
1983	74.9	70.5	76.7	66.0	65.4	62.3	67.9
1984	80.4	78.3	85.7	75.7	78.6	72.7	74.3
1985	79.5	77.8	80.7	73.4	83.4	74.0	74.9
1986	79.0	76.1	78.3	69.6	79.5	70.7	73.9
1987	81.4	78.6	80.0	72.4	78.1	79.6	78.5
1988	83.9	82.5	82.3	79.5	80.5	88.6	83.1
1989	83.9	82.8	81.6	82.2	79.2	86.6	83.1
1989 1st Qtr.	84.7	83.6	82.1	82.6	83.5	89.2	84.2
2nd Qtr.	84.5	83.6	81.9	82.9	81.1	87.0	83.6
3rd Qtr.	83.7	82.7	81.6	82.2	77.1	87.1	82.5
4th Qtr.	82.9	81.3	81.0	81.2	75.1	83.0	82.0
1990 1st Qtr.	82.6	80.9	80.9	81.5	62.8	83.5	80.9

Source: Federal Reserve Board.



PRODUCTIVITY IN MANUFACTURING

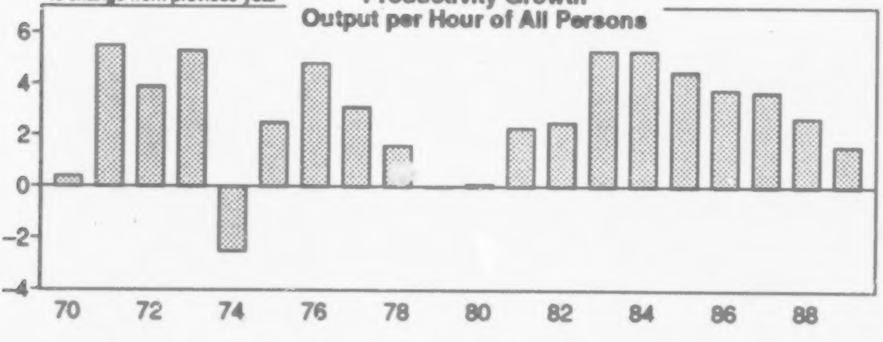
Indexes, 1970 to Date

1977=100

Year	Productivity (a) (Output Per Hour of All Persons)	Constant Dollar Output	Hours (All Persons)	Compensation Per Hour Current	Compensation Per Hour Real (b)	Unit Labor Costs
1970	80.2	78.6	97.9	57.0	89.0	71.0
1971	84.6	79.9	94.5	60.4	90.3	71.4
1972	87.9	87.0	99.0	63.3	91.8	72.0
1973	92.6	96.3	104.0	68.2	93.1	73.7
1974	90.3	91.7	101.6	75.9	93.2	84.0
1975	92.6	84.9	91.6	84.9	95.6	91.7
1976	97.0	93.1	96.0	92.0	98.0	94.9
1977	100.0	100.0	100.0	100.0	100.0	100.0
1978	101.6	106.0	104.3	108.3	100.6	106.6
1979	101.6	108.1	106.3	118.9	99.2	117.0
1980	101.7	103.2	101.5	132.8	97.7	130.6
1981	104.0	104.8	100.8	145.7	97.1	140.1
1982	106.6	98.4	92.3	158.7	99.6	148.8
1983	112.2	104.7	93.4	162.7	99.0	145.1
1984	118.2	117.5	99.4	168.1	98.1	142.3
1985	123.5	122.0	98.7	176.3	99.3	142.7
1986	128.2	124.7	97.3	184.3	101.9	143.8
1987	132.9	130.1	97.9	189.2	100.9	142.3
1988(r)	136.5	138.1	101.2	196.0	100.4	143.6
1989(p)	138.7	141.6	102.1	204.3	99.9	147.3
1989 1st Qtr.	138.8	141.4	102.0	201.9	100.3	145.6
2nd Qtr.	139.5	142.2	101.9	203.2	99.5	145.6
3rd Qtr.	139.0	141.7	102.0	206.1	100.3	148.3
4th Qtr.	140.1	141.2	100.8	209.6	101.0	149.7
1990 1st Qtr.	141.8	141.6	100.1	211.4	99.9	149.2

(a) – The productivity index is obtained by dividing the constant dollar output index by the labor input (hours) index.
(b) – Compensation per hour adjusted for changes in the CPI–U. Source: U.S. Bureau of Labor Statistics.

Note: This table is based on output and compensation data published by the Commerce Department's Bureau of Economic Analysis. The indexes for manufacturing output, which are based on figures taken from Gross National Product components, vary from those for manufacturing production in the tables of industrial production indexes. The latter are generated independently by the Federal Reserve Board from their own survey and using their own methodology.



MANUFACTURERS' SHIPMENTS

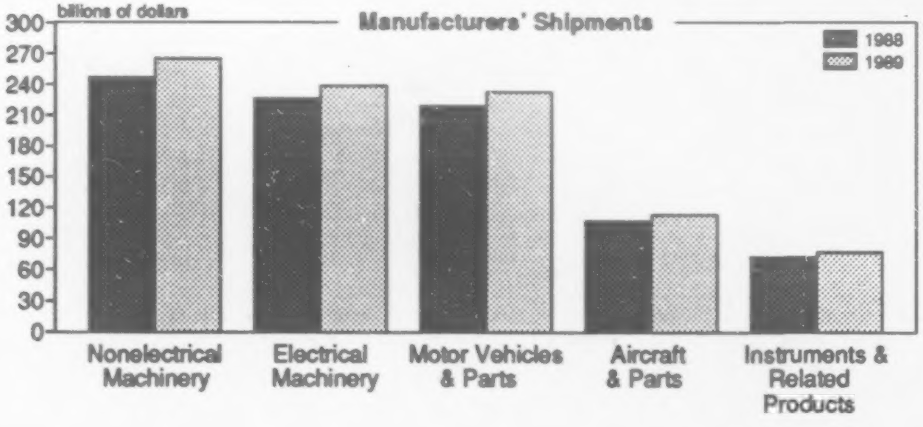
Major Industry Groups, 1980 to Date

(billions of dollars)

Year	Total Manufacturing	Durables	By Industry Group Primary Metals	Fabricated Metal Products	By Capital Goods Industries Nondefense	Defense
1980	$1,852.7	$ 930.6	$133.9	$116.2	$272.4	$40.6
1981	2,017.5	1,006.5	141.9	123.7	297.7	48.2
1982	1,960.2	952.2	104.7	119.4	281.0	60.4
1983	2,054.9	1,019.5	108.5	122.1	271.8	74.5
1984	2,254.4	1,159.5	119.1	135.9	311.1	83.8
1985	2,280.2	1,188.2	110.5	139.6	324.2	96.7
1986	2,260.3	1,199.9	105.6	138.0	320.3	106.8
1987	2,390.0	1,263.5	117.1	135.0	336.2	109.4
1988(r)	2,611.6	1,368.2	142.2	144.1	380.0	106.6
1989(p)	2,781.6	1,471.5	145.4	162.6	413.8	106.2

Year	Nonelectrical Machinery	Electrical Machinery	Motor Vehicles and Parts	Aircraft and Parts	Instruments & Related Products
1980	$180.7	$128.6	$104.6	$58.5	$44.1
1981	201.5	140.2	117.0	65.7	48.3
1982	187.9	147.9	112.3	66.4	51.8
1983	179.0	159.2	147.3	74.8	53.6
1984	210.4	187.6	179.3	78.8	59.4
1985	215.2	193.4	188.5	90.8	61.0
1986	208.5	196.2	191.6	101.0	61.9
1987	216.6	210.7	197.0	103.6	66.8
1988(r)	247.2	227.1	219.3	107.6	72.5
1989(p)	265.5	239.4	232.8	113.7	77.1

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories, and Orders."



MANUFACTURERS' NET NEW ORDERS

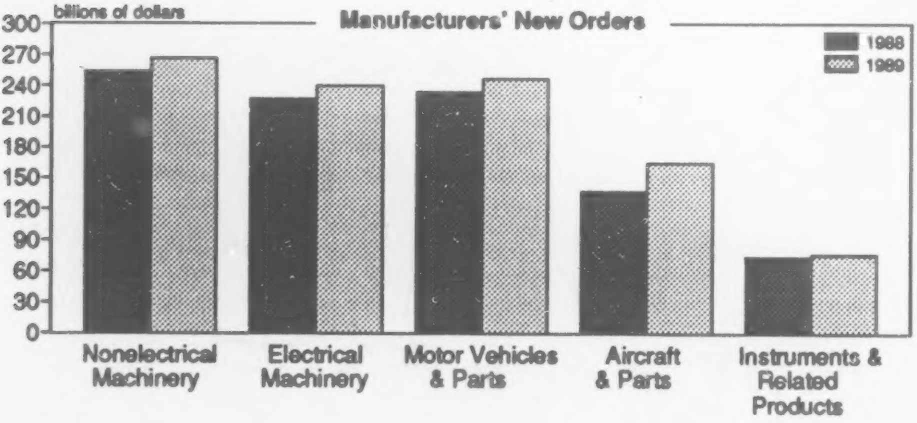
Major Industry Groups, 1980 to Date

(billions of dollars)

			By Industry Group		By Capital Goods Industries	
Year	Total Manufacturing	Durables	Primary Metals	Fabricated Metal Products	Nondefense	Defense
1980	$1,873.9	$952.3	$134.1	$115.3	$279.1	$58.7
1981	2,013.0	1,002.6	137.0	122.4	288.6	59.1
1982	1,947.3	940.1	98.2	113.6	259.9	82.7
1983	2,089.5	1,051.2	113.1	121.5	265.2	97.9
1984	2,277.5	1,183.0	117.1	139.1	314.9	104.8
1985	2,291.0	1,198.1	110.4	138.4	324.8	109.8
1986	2,264.0	1,202.0	105.9	137.9	318.6	110.4
1987	2,423.6	1,293.2	122.6	136.5	356.5	109.8
1988(r)	2,659.5	1,435.6	144.2	142.6	420.3	110.0
1989(p)	2,829.9	1,520.4	142.3	159.9	467.3	108.3

Year	Nonelectrical Machinery	Electrical Machinery	Motor Vehicles and Parts	Aircraft and Parts	Instruments & Related Products
1980	$180.6	$135.6	$122.0	$ 73.1	$44.5
1981	200.5	144.7	134.9	64.1	47.7
1982	171.1	157.3	120.1	73.4	52.3
1983	179.4	168.1	160.3	86.5	54.8
1984	210.2	198.0	188.3	90.9	60.7
1985	214.7	200.8	197.0	100.0	61.4
1986	203.1	198.2	202.0	106.5	62.2
1987	221.0	212.4	210.5	116.4	67.9
1988(r)	254.4	227.4	234.3	137.3	73.7
1989(p)	267.1	240.5	247.1	165.7	76.9

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories, and Orders."



MANUFACTURERS' UNFILLED ORDERS

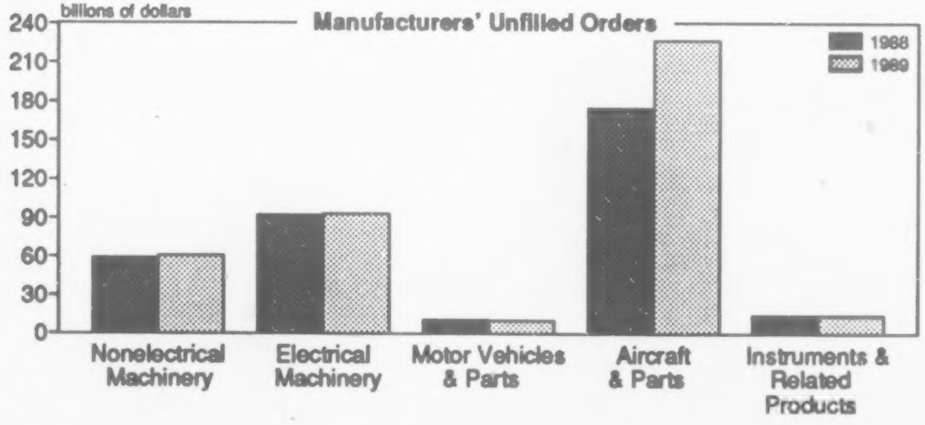
Major Industry Groups, 1980 to Date

(billions of dollars)

			By Industry Group		By Capital Goods Industries	
Year	Total Manufacturing	Durables	Primary Metals	Fabricated Metal Products	Nondefense	Defense
1980	$318.8	$308.1	$29.5	$30.2	$154.2	$63.4
1981	316.4	306.4	26.5	29.0	145.2	74.8
1982	310.4	299.6	14.9	26.8	122.5	100.7
1983	344.9	331.3	19.5	26.2	115.9	124.1
1984	368.0	354.8	17.5	29.4	119.7	145.1
1985	378.8	364.7	17.4	28.2	120.3	158.2
1986	382.4	366.8	17.7	28.2	118.6	161.8
1987	416.0	396.6	23.2	29.6	138.9	162.1
1988(r)	463.9	444.0	25.1	28.2	178.8	165.5
1989(p)	512.3	492.8	22.0	25.4	232.3	167.6

As of Dec. 31	Nonelectrical Machinery	Electrical Machinery	Motor Vehicles and Parts	Aircraft and Parts	Instruments & Related Products
1980	$73.2	$47.3	$ 8.6	$ 87.2	$6.9
1981	71.9	51.2	7.1	87.7	7.1
1982	53.3	61.8	7.9	94.1	9.2
1983	53.7	70.7	11.9	105.9	10.5
1984	53.5	81.1	10.7	117.9	11.7
1985	53.0	88.5	9.4	127.1	12.2
1986	47.6	90.4	9.4	132.7	12.4
1987	52.0	92.1	10.3	145.4	13.5
1988(p)	59.3	92.4	11.1	175.1	14.7
1989(r)	60.9	93.5	10.4	227.1	14.5

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories, and Orders."



MANUFACTURERS' INVENTORIES

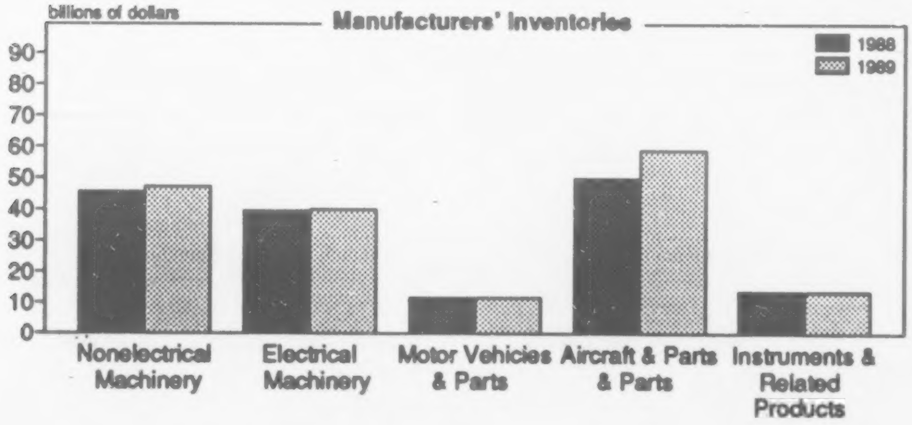
Major Industry Groups, 1980 to Date

(billions of dollars)

As of Dec. 31	Total Manufacturing	Durables	By Industry Group Primary Metals	 Fabricated Metal Products	By Capital Goods Industries Nondefense	 Defense
1980	$261.5	$172.1	$23.1	$19.2	$67.6	$10.3
1981	280.1	185.6	26.5	19.8	72.2	12.9
1982	307.2	197.0	23.8	21.1	77.9	18.2
1983	308.0	196.6	22.0	21.6	72.7	21.0
1984	329.6	214.5	21.9	22.6	79.1	26.8
1985	322.4	209.9	19.5	21.9	74.8	30.6
1986	311.1	204.2	17.6	21.3	73.0	29.9
1987	325.7	212.3	18.0	22.4	75.2	32.5
1988(r)	348.5	229.0	20.2	23.1	83.6	34.2
1989(p)	365.2	241.8	20.5	23.0	91.9	36.7

As of Dec. 31	Nonelectrical Machinery	Electrical Machinery	Motor Vehicles and Parts	Aircraft and Parts	Instruments & Related Products
1980	$40.3	$25.4	$ 9.6	$21.7	$ 8.8
1981	43.9	27.4	9.0	24.4	9.3
1982	47.1	30.0	8.5	29.7	10.9
1983	43.9	31.4	10.1	29.8	11.2
1984	47.4	37.6	11.6	34.4	12.2
1985	44.6	37.6	11.6	35.9	12.4
1986	41.2	37.5	11.1	36.4	12.2
1987	41.0	38.4	11.4	40.8	12.3
1988(r)	45.8	39.7	11.8	49.9	13.7
1989(p)	47.3	40.0	11.8	59.1	13.7

Sources: U. S. Bureau of the Census, "Manufacturers' Shipments, Inventories and Orders."



PRODUCER PRICE INDEXES

For Machine Tools and Selected Materials and Components

1982 = 100, unless otherwise indicated

Commodity	1985	1986	1987	1988	1989
Metal Cutting Machine Tools	107.3	109.6	112.6	117.4	123.4
Metal Forming Machine Tools	107.0	108.7	110.2	113.2	118.1
Commodity Indexes					
Finished Goods	104.7	103.2	105.4	108.0	113.6
All Commodities	103.2	100.2	102.8	106.9	112.2
Industrial Commodities	103.7	100.0	102.6	106.3	111.6
Durable Manufactured Goods	106.5	107.5	109.6	114.1	118.3
Industrial Power, 500 KW Demand	112.8	114.5	111.9	112.6	116.8
Prepared Paint	105.3	107.0	108.1	112.2	119.5
Iron and Steel	104.8	101.1	104.5	115.7	119.1
Foundry and Forge Shop Products	105.2	105.2	105.6	109.6	114.6
Gray & Ductile Iron Cast	103.3	103.7	103.4	106.0	108.8
Steel Mill Products	104.7	99.8	102.3	110.7	114.5
Semi–finished Steel Products	100.3	99.0	100.2	109.0	113.1
Finished Steel Products	104.5	99.9	102.3	110.6	114.5
Nonferrous Metals	99.6	98.5	108.7	133.2	141.5
Primary Nonferrous Metals	93.6	93.8	109.2	144.3	149.2
Nonferrous Mill Shapes	102.9	99.9	105.7	130.1	137.4
Aluminum Mill Shapes	107.8	102.6	105.5	130.9	135.4
Nonferrous Wire and Cable	100.9	101.8	106.5	129.6	146.1
Metalworking Machinery and Equipment	106.6	108.4	110.1	113.5	118.2
Cutting Tools & Access.	105.7	107.5	108.9	111.0	115.0
Abrasive Products	105.9	106.7	108.1	111.3	118.7
General Purpose Machy. & Equipment	105.7	107.2	108.3	112.7	119.0
Pumps, Compressors & Equipment	102.6	104.1	105.2	108.9	115.0
Fluid Power Equipment	108.1	109.8	111.3	114.6	119.7
Mechanical Power Transmission Equipment	108.2	110.6	112.0	116.0	121.1
Miscellaneous General Purpose Equipment	106.2	107.7	109.0	115.4	124.4
Ball & Roller Bearings	105.9	107.3	107.8	114.0	124.1
Electrical Machinery and Equipment	109.6	111.2	112.7	114.4	117.5
Motors, Generators & Mtr Generator Sets	113.3	113.5	115.4	121.8	129.0
Integral Elec. Motors, AC (a)	110.7	106.1	105.6	113.9	121.7
Transformers and Power Regulators	105.0	105.6	107.6	108.8	117.3
Switchgear, Switchboard, etc. Equipment	106.7	108.1	110.2	113.2	119.0
Industrial Controls	105.2	107.4	109.1	111.9	116.6
Electronic Components & Accessories	112.4	114.5	115.1	117.5	119.4
Assembly Machines (a)	107.0	109.9	110.2	113.4	116.6
Precision Measuring Tools	109.9	112.4	115.2	120.5	124.7
Industrial Material Handling Equipment	102.7	103.4	104.3	107.5	111.7
Plasticworking Machinery	114.0	111.8	124.9	129.4	134.2
Semiconductor Machinery & Parts (b)	na	na	na	100.8	103.8
Integrating and Measuring Equipment	110.0	111.2	113.7	115.2	119.7

(a) June, 1983 = 100. (b) June, 1987 = 100. Source: U. S. Department of Labor, Bureau of Labor Statistics.

Note: The individual commodities shown are selected components of each major commodity grouping. All indexes are annual averages.

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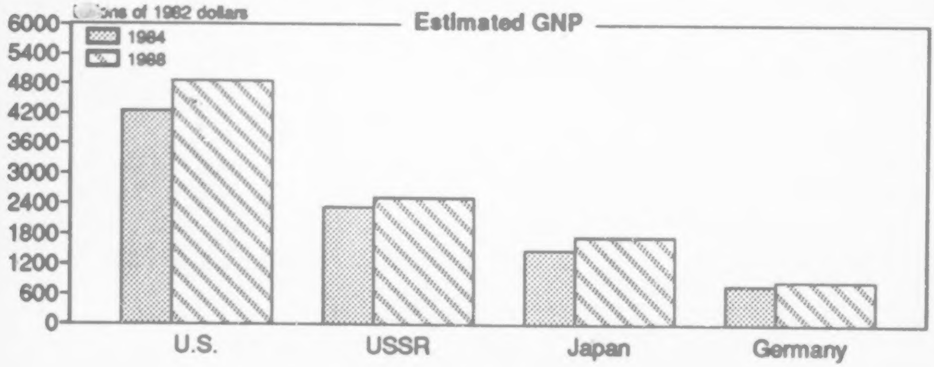
ESTIMATED GROSS NATIONAL PRODUCT
1984 to 1988
(billions of constant 1988 dollars)

	1984	1985	1986	1987	1988
WORLD	**$16,500**	**$16,900**	**$17,500**	**$18,000**	**$18,600**
Developed countries	**10,700**	**11,000**	**11,300**	**11,700**	**12,200**
United States	4,260	4,404	4,528	4,682	4,864
Australia	191	200	204	212	218
Canada	409	427	439	456	475
Japan	1,495	1,561	1,597	1,662	1,758
Sweden	114	116	117	119	122
Switzerland	100	103	106	108	111
European Community	**3,644**	**3,724**	**3,817**	**3,915**	**4,060**
Belgium	115	116	118	120	125
France	698	707	721	736	762
Italy	669	686	705	726	754
Netherlands	176	180	184	186	191
Spain	314	320	331	348	365
United Kingdom	659	680	701	726	755
Germany, Fed. Rep. of	796	809	827	841	870
Less developed countries	**2,050**	**2,120**	**2,200**	**2,270**	**2,360**
Argentina	76	72	76	78	78
Brazil	270	293	317	326	325
Egypt	21	22	23	23	23
Hungary	90	88	90	91	92
India	213	227	237	251	271
Mexico	174	179	172	175	177
Pakistan	30	32	35	38	39
Phillipines	35	37	34	36	39
South Korea	115	122	135	151	169
Taiwan	84	87	99	110	118
Thailand	45	47	48	51	57
Yugoslavia	148	149	155	154	154
OPEC					
Indonesia	63	64	67	69	72
Nigeria	27	29	28	29	30
Saudi Arabia	88	83	76	76	74
Venezuela	51	51	54	56	58
Communist Countries	**3,730**	**3,790**	**3,920**	**4,000**	**4,090**
Soviet Union	2,348	2,369	2,450	2,492	2,535
Eastern Europe	888	894	916	915	927
Bulgaria	66	64	67	66	68
Czechoslovakia	150	151	155	156	158
Germany, Dem. Rep. of	191	197	200	204	207
Poland	266	268	275	271	276
Romania	125	126	129	128	126
Other					
China	233	263	285	314	350

Source: Central Intelligence Agency, Handbook of Economic Statistics, 1989.

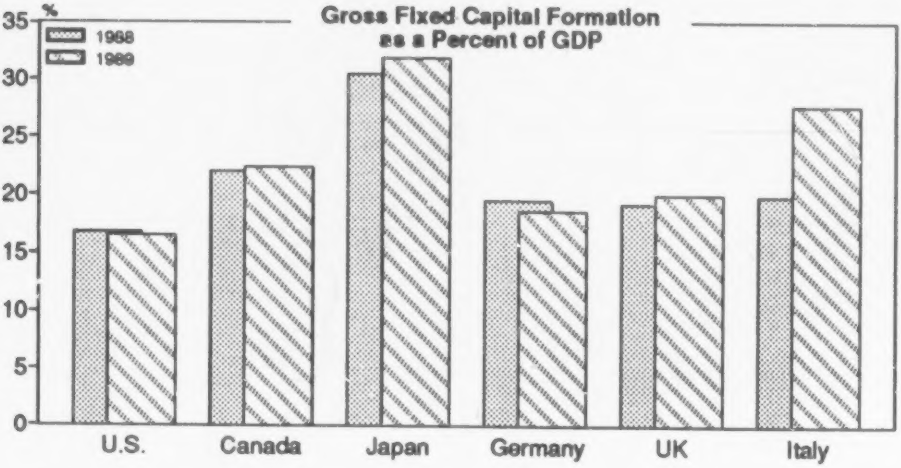


GROSS FIXED CAPITAL FORMATION AS PERCENT OF GROSS DOMESTIC PRODUCT

1985 to Date

	1985	1986	1987	1988	1989
United States	18.4 %	17.9 %	17.2 %	16.8 %	16.5 %
Canada	19.7	20.0	20.8	22.0	22.4
Mexico	19.8	19.4	18.9	na	na
Japan	27.7	27.6	28.9	30.5	31.9
South Korea	28.2	27.6	28.5	28.8	na
Malaysia	27.6	25.3	24.0	25.5	na
Thailand	23.7	21.7	23.5	25.8	na
Germany, Fed. Rep. of	19.7	19.5	19.4	19.5	18.6
France	19.3	19.2	19.5	20.3	na
United Kingdom	17.0	16.9	17.6	19.2	18.5
Italy	20.7	19.7	20.0	19.9	20.0
Sweden	19.0	19.3	21.0	23.0	na
Switzerland	23.8	24.2	25.3	26.6	27.7

Note: Fixed Capital Formation consists of non-residential structures and producers durable equipment as well as residential structures. Source: International Monetary Fund, "International Financial Statistics."

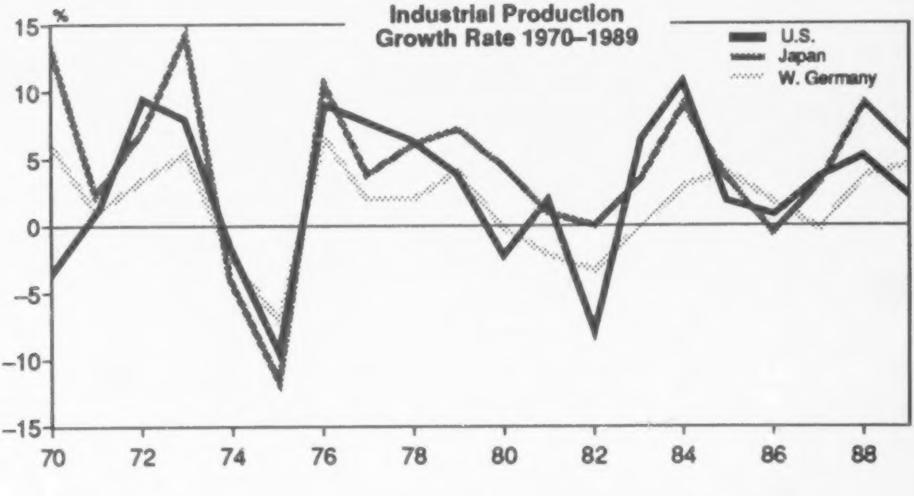


INDUSTRIAL PRODUCTION[1]

Annual Growth Rate 1970 to Date

Year	United States	Canada	Japan	United Kingdom	France	Fed. Rep. of Germany	Italy
1970	–3.2%	1.5%	13.8%	0.6%	4.3%	6.4%	6.5%
1971	1.3	5.4	2.7	–0.6	6.8	1.2	–0.1
1972	9.7	7.6	7.3	1.8	5.1	3.6	4.2
1973	8.1	9.9	14.9	9.0	7.3	5.7	9.7
1974	–1.5	3.5	–3.9	–2.1	2.3	–2.2	4.5
1975	–8.8	–6.1	–11.0	–5.4	–6.7	–6.7	–9.1
1976	9.3	5.5	11.2	3.3	8.3	7.1	12.3
1977	7.9	2.3	4.1	5.2	1.1	2.2	–0.8
1978	6.5	4.0	6.3	2.8	2.2	2.2	3.8
1979	4.0	6.0	7.4	3.9	4.3	4.3	6.7
1980	–1.9	–3.4	4.6	–6.6	1.0	0.0	5.5
1981	2.3	2.0	1.1	–3.1	–2.0	–2.0	–1.5
1982	–7.2	–9.8	0.2	1.9	0.0	–3.1	–3.0
1983	6.5	7.5	3.6	3.7	0.0	0.0	–3.2
1984	11.1	12.1	9.4	0.2	2.1	3.2	3.2
1985	2.0	5.6	3.7	5.4	1.0	4.2	1.2
1986	1.0	–0.1	–0.3	2.2	0.0	2.0	3.6
1987	3.8	5.7	3.4	3.5	2.0	0.0	3.9
1988	5.4	6.2	9.4	3.6	3.9	3.9	6.2
1989	2.5	1.1	6.1	0.8	5.2	4.7	2.6

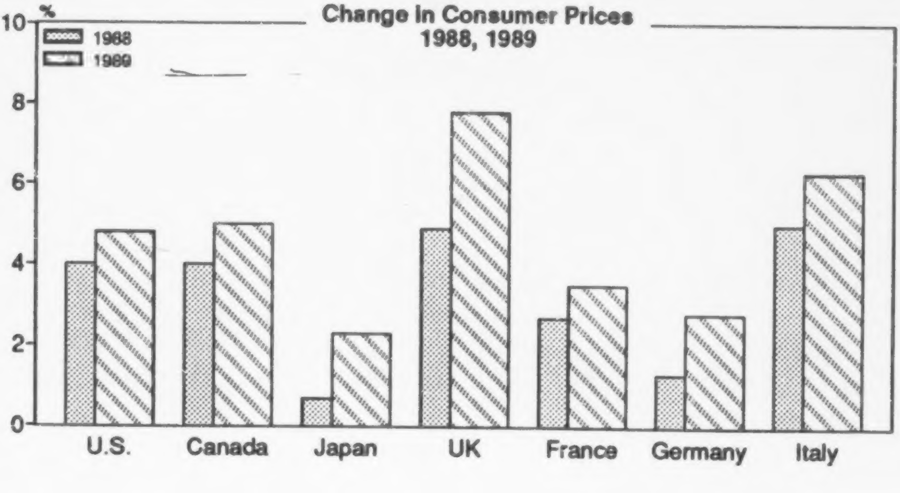
[1] Excludes construction. Source: International Monetary Fund, "International Financial Statistics," and NMTBA.



CONSUMER PRICES
Annual Change in Prices, 1970 to Date

Year	United States	Canada	Japan	United Kingdom	France	Fed. Rep. of Germany	Italy
1970	5.9%	3.5%	7.6%	6.5%	6.3%	3.5%	4.5%
1971	4.2	2.8	6.5	9.2	5.1	5.2	5.0
1972	3.5	4.8	4.8	7.5	6.4	5.5	6.1
1973	6.2	7.5	11.7	9.1	7.4	7.2	10.3
1974	10.9	11.0	23.3	15.9	13.5	6.8	19.2
1975	9.2	10.8	11.6	24.1	11.9	5.9	17.1
1976	6.0	7.4	9.5	16.6	9.6	4.3	16.7
1977	6.4	8.1	8.1	15.9	9.5	3.8	18.6
1978	7.6	9.0	4.3	8.2	9.1	2.6	12.0
1979	11.2	9.1	3.7	13.4	10.7	4.1	14.8
1980	13.5	10.1	7.7	18.0	13.2	5.5	21.3
1981	10.4	12.4	5.0	11.9	13.4	6.3	19.5
1982	6.0	10.8	2.7	8.6	11.8	5.2	16.5
1983	3.2	5.9	1.8	4.5	9.6	3.4	14.7
1984	4.3	4.3	2.3	5.0	7.5	2.4	10.8
1985	3.5	4.0	2.0	6.0	5.7	2.1	9.2
1986	1.9	4.2	0.6	3.4	2.5	–0.1	5.9
1987	3.7	4.3	0.1	4.2	3.3	0.2	4.7
1988	4.0	4.0	0.7	4.9	2.7	1.3	5.0
1989	4.8	5.0	2.3	7.8	3.5	2.8	6.3

Source: International Monetary Fund, "International Financial Statistics."

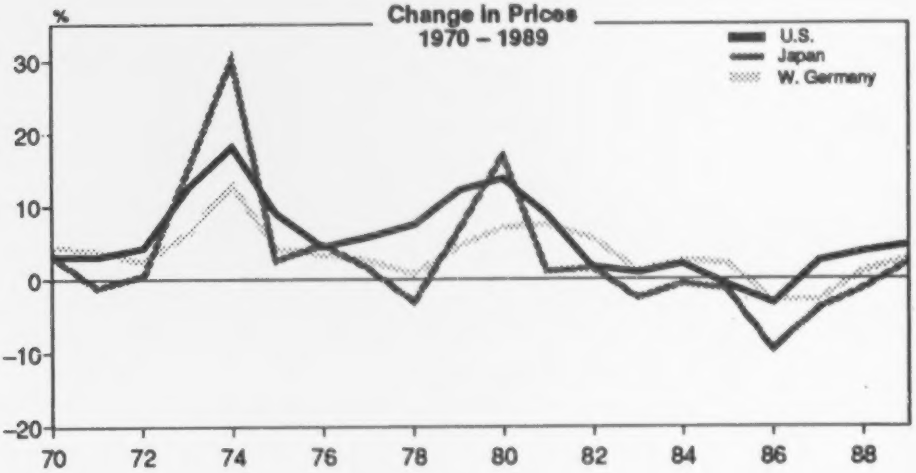


PRODUCER PRICES

Annual Change in Prices, 1970 to Date

Year	United States	Canada	Japan	United Kingdom	France	Fed. Rep. of Germany	Italy
1970	3.5%	2.3%	3.6%	6.3%	7.5%	4.8%	7.0%
1971	3.4	2.0	–0.8	9.4	2.1	4.2	4.4
1972	4.6	4.5	0.8	5.0	4.5	2.7	3.5
1973	13.0	11.3	15.8	7.3	14.8	6.6	17.6
1974	18.8	19.0	31.4	23.7	29.2	13.6	40.2
1975	9.3	11.1	3.0	23.1	–5.8	4.5	8.6
1976	4.8	5.2	5.1	16.1	7.3	3.7	23.0
1977	6.1	7.9	1.9	18.2	5.7	2.9	17.5
1978	7.8	9.2	–2.6	9.8	4.4	1.1	8.4
1979	12.5	14.6	7.3	10.9	13.3	4.8	15.4
1980	14.2	13.5	17.8	14.1	8.8	7.5	20.0
1981	9.1	10.1	1.4	9.6	11.0	7.8	17.6
1982	2.0	6.1	1.8	7.7	11.0	5.9	13.8
1983	1.2	3.4	–2.2	5.4	11.1	1.5	9.8
1984	2.4	4.1	–0.3	5.8	13.2	2.8	10.4
1985	–0.5	2.7	–1.1	5.3	4.1	2.5	7.3
1986	–2.9	0.8	–9.1	4.3	–2.8	–2.5	–0.9
1987	2.7	2.7	–3.7	3.8	0.2	–2.5	2.6
1988	4.0	3.9	–1.0	4.5	5.5	1.3	4.7
1989	4.9	2.7	2.5	5.1	NA	3.1	6.4

Source: International Monetary Fund, "International Financial Statistics."



WORLD TRADE
1987 to Date
(billions of U.S. dollars)

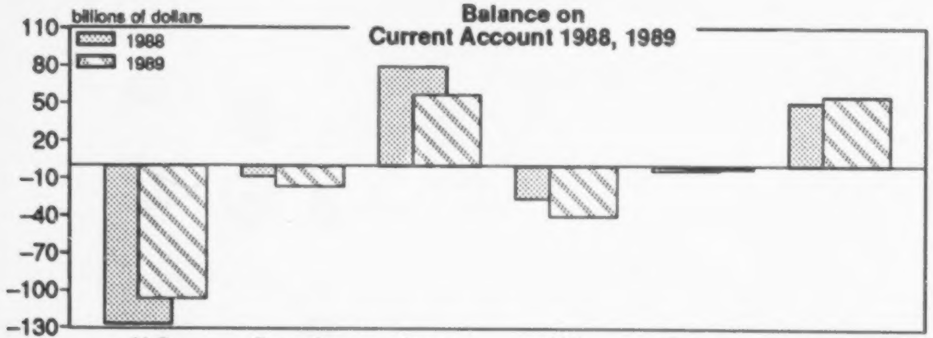
	Exports			Imports		
	1987	1988	1989	1987	1988	1989
World	$2,341.7	$2,683.2	$2,894.2	$2,407.8	$2,754.7	$2,974.0
Industrial Countries	1,735.1	1,987.7	2,128.3	1,829.0	2,067.9	2,237.4
United States	254.1	322.4	364.0	424.4	459.5	492.9
Canada	97.9	117.8	121.4	92.6	112.2	121.2
Japan	231.3	264.9	273.9	151.0	187.4	209.7
United Kingdom	131.3	145.2	152.3	154.4	189.3	197.7
France	148.4	167.8	179.4	158.5	178.9	193.0
Germany, Fed. Rep. of	294.4	323.3	341.4	228.4	250.5	269.8
Italy	116.4	127.9	140.7	125.1	138.6	153.0
Other industrial	461.3	518.4	555.2	494.6	551.5	600.1
Developing Countries	606.6	695.5	765.8	578.8	686.8	736.6
Africa	63.6	60.4	na	57.8	63.0	na
Asia	295.4	363.8	405.2	283.8	367.8	414.2
West Hemisphere	89.3	104.4	NA	80.6	92.8	NA
Middle East	89.7	100.8	NA	95.0	96.5	NA

Source: International Monetary Fund, "International Financial Statistics."

BALANCE OF TRADE AND PAYMENTS
1987 to Date
(billions of U.S. dollars)

	Balance of Trade[1]			Balance on Current Account[2]		
	1987 (r)	1988 (r)	1989 (p)	1987 (r)	1988 (r)	1989 (p)
United States	−159.5	−127.2	−113.2	−143.7	−126.6	−105.9
Canada	9.0	8.9	5.0	−7.1	−8.3	−16.6
Japan	96.4	95.0	77.1	87.0	79.6	56.8
United Kingdom	−18.0	−37.0	−43.0	−6.4	−26.0	−40.0
France	−8.7	−8.1	−9.9 E	−4.4	−3.5	−2.3 E
West Germany	69.9	79.4	76.7	46.1	50.4	55.5
Italy	−0.1	−0.8	NA	−1.6	−5.4	NA

[1] Merchandise exports (f.o.b.) minus merchandise imports (f.o.b.). [2] Trade balance plus the balance of other goods, services, and income; private unrequited transfers; and official unrequited transfers, not included elsewhere.
Source: International Monetary Fund, "International Financial Statistics."


Balance on Current Account 1988, 1989

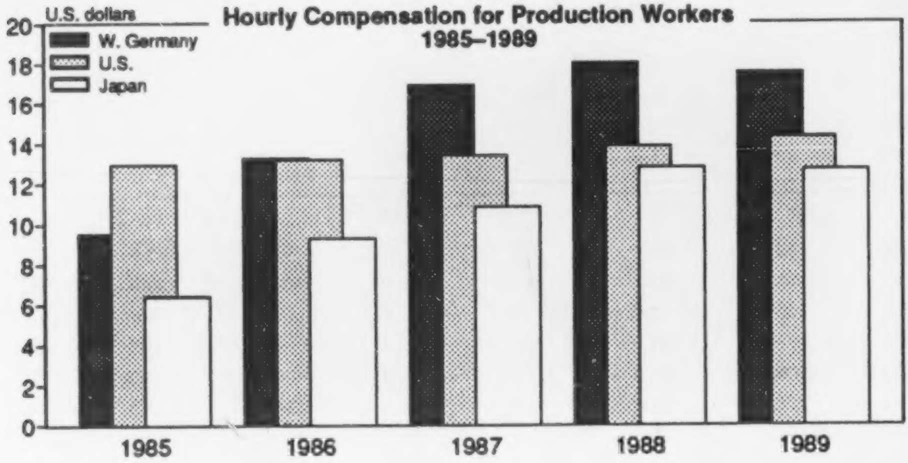
HOURLY COMPENSATION FOR PRODUCTION WORKERS

All Manufacturing, By Country, 1985 to 1989

(U.S. dollars)

	1985	1986	1987	1988	1989
United States	$12.96	$13.21	$13.40	$13.85	$14.31
Canada	10.80	11.00	11.95	13.54	14.71
Japan	6.43	9.31	10.83	12.80	12.68
Germany, Fed. Rep. of	9.56	13.29	16.91	18.01	17.53
Italy	7.32	9.91	12.13	12.87	13.20
United Kingdom	6.19	7.54	8.97	10.46	10.48
France	7.52	10.27	12.42	12.96	12.75
Switzerland	9.66	13.76	17.08	17.98	16.69
Taiwan	1.46	1.67	2.19	2.72	3.43

Source: U.S. Bureau of Labor Statistics, Branch of International Comparisons



PRODUCTIVITY IN MANUFACTURING

Selected Countries, 1980 to Date

(Indexes: 1982= 100)

	United States	Canada	Japan	France	Fed Rep of Germany	Italy	United Kingdom
				Output Per Man Hour (Productivity)			
1980	95.3	99.9	90.9	90.6	97.8	95.1	89.9
1981	97.5	104.8	94.3	93.4	99.3	97.6	94.5
1982	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	105.2	107.3	105.4	105.1	105.1	105.3	108.4
1984	110.8	116.4	113.0	108.5	108.5	115.8	114.3
1985	115.9	119.8	119.4	112.4	112.4	122.1	118.0
1986	120.2	118.4	121.3	111.4	111.4	123.2	122.8
1987	124.7	119.2	130.7	109.5	109.5	126.5	130.1
1988	127.6	121.2	136.9	114.4	114.4	130.1	137.1
1989	130.1	123.8	144.8	119.6	119.6	133.8	144.1
				Unit Labor Cost[1]			
1980	87.8	83.1	107.3	125.2	123.6	116.8	118.1
1981	94.1	88.9	113.8	109.2	104.3	103.3	112.1
1982	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	97.5	99.0	102.5	92.9	94.5	99.1	85.5
1984	95.6	91.0	98.5	86.5	85.7	89.4	76.4
1985	95.9	88.2	97.0	87.7	84.5	87.7	77.1
1986	96.6	91.1	141.9	116.4	120.2	115.8	90.5
1987	95.6	98.6	156.9	137.2	154.1	137.6	101.3
1988	96.8	109.7	172.7	137.3	157.1	140.3	110.9
1989	99.0	121.0	161.8	128.2	146.8	143.4	106.9
				Hourly Compensation [1]			
1980	83.7	83.0	97.5	113.5	120.9	111.1	106.1
1981	91.8	93.1	107.3	102.0	103.6	100.9	105.9
1982	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	102.5	106.2	106.0	95.3	99.3	104.3	92.7
1984	106.0	105.9	111.3	90.4	93.0	103.5	87.4
1985	111.1	105.6	115.8	95.4	95.0	107.0	91.0
1986	116.1	107.8	172.1	129.1	133.9	142.7	110.9
1987	119.2	117.6	205.0	156.1	168.7	174.0	131.8
1988	123.5	132.9	236.4	164.1	179.8	182.5	152.0
1989	128.8	149.9	234.4	160.4	175.6	191.8	154.0

[1] *U.S. dollar basis. Source: U.S. Department of Labor, Bureau of Labor Statistics.*

EXCHANGE RATES IN THE G–7 COUNTRIES

1970 – 1989

(indexed value of the foreign currency relative to the U.S. dollar, 1982=100)

	United States	Canada	Japan	France	Fed Rep of Germany	Italy	United Kingdom
1970	100.0	118.3	69.5	119.0	66.6	215.9	137.1
1971	100.0	122.2	71.7	119.4	69.8	219.0	139.8
1972	100.0	124.6	82.2	130.4	76.2	232.0	143.1
1973	100.0	123.4	91.9	148.3	91.7	232.8	140.2
1974	100.0	126.2	85.4	136.2	94.0	208.1	133.9
1975	100.0	121.3	83.9	153.7	98.9	207.5	127.1
1976	100.0	125.2	84.0	137.8	96.5	163.1	103.2
1977	100.0	116.2	93.0	133.9	104.6	153.4	99.8
1978	100.0	108.3	119.5	146.2	121.1	159.5	109.7
1979	100.0	105.4	114.2	154.6	132.5	162.9	121.4
1980	100.0	105.6	110.4	155.9	133.8	158.3	133.1
1981	100.0	103.0	112.9	121.0	107.7	118.9	115.8
1982	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1983	100.0	100.2	104.8	86.3	95.1	89.1	86.7
1984	100.0	95.3	104.9	75.3	85.3	77.1	76.5
1985	100.0	90.4	104.4	73.3	82.5	70.9	74.2
1986	100.0	88.8	147.9	95.0	111.9	90.8	84.0
1987	100.0	93.1	172.2	109.4	135.0	104.4	93.8
1988	100.0	100.3	194.3	110.4	138.2	104.0	101.9
1989	100.0	104.2	180.4	103.1	129.1	98.7	93.7

Note: The Group of 7 (G–7) countries consists of the United States, Canada, Japan, France, Germany, Italy, and the United Kingdom. Source: U.S. Department of Labor, Bureau of Labor Statistics

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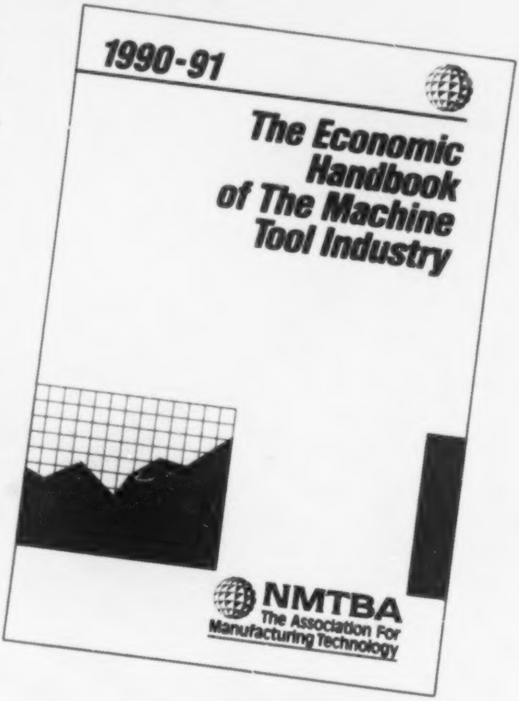

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SHIPMENTS OF MACHINE TOOLS, 1960 TO DATE

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Year	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1960	$ 744	$ 580	$ 164	$ 541	$ 420	$ 121	$ 203	$ 160	$ 43
1961	751	522	229	541	366	175	210	156	54
1962	821	606	215	613	450	163	208	156	52
1963	896	741	155	639	526	113	257	215	42
1964	1,164	959	205	845	679	166	319	280	39
1965	1,426	1,249	177	1,023	886	137	403	363	40
1966	1,685	1,535	150	1,222	1,098	124	463	437	26
1967	1,806	1,618	188	1,353	1,211	142	453	407	46
1968	1,727	1,563	164	1,358	1,238	120	369	325	44
1969	1,597	1,446	151	1,192	1,077	115	405	369	36
1970	1,443	1,239	204	993	827	166	450	412	38
1971	998	840	158	672	554	118	326	286	40
1972	1,019	894	124	714	627	87	304	267	37
1973	1,501	1,323	178	1,074	935	139	427	388	39
1974	2,031	1,763	267	1,445	1,241	205	585	522	63
1975	2,452	2,033	419	1,879	1,548	331	573	484	89
1976	2,060	1,744	316	1,482	1,270	212	578	474	104
1977	2,281	2,030	251	1,651	1,470	181	630	560	70
1978	3,013	2,689	325	2,189	1,960	228	825	729	96
1979	3,877	3,465	411	2,930	2,605	325	947	860	87
1980	4,692	4,084	608	3,681	3,206	475	1,011	878	133
1981	5,096	4,377	719	4,105	3,553	552	991	824	167
1982	3,604	3,198	406	2,895	2,599	296	710	600	110
1983	1,845	1,630	215	1,372	1,200	172	474	430	43
1984	2,286	2,093	193	1,607	1,484	123	679	609	71
1985	2;545	2,291	254	1,742	1,549	194	803	743	60
1986	2,579	2,306	272	1,890	1,685	206	688	621	67
1987	2,324	2,037	287	1,677	1,499	178	647	538	109
1988	2,399	2,102	297	1,575	1,400	174	825	702	122
1989	3,195	2,763	432	2,359	2,059	299	837	704	133

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SHIPMENTS OF MACHINE TOOLS QUARTERLY AND YEARLY, 1970–1974

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Quarter	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1970–1 qtr.	$ 400.65	$ 351.95	$ 48.70	$ 279.40	$ 241.50	$ 37.90	$121.25	$110.45	$ 10.80
2	402.80	348.00	54.80	280.75	236.20	44.55	122.05	111.80	10.25
3	320.95	269.35	51.60	220.40	176.05	44.35	100.55	93.30	7.25
4	318.65	269.65	49.00	212.35	173.60	38.75	106.30	96.05	10.25
Total	$1,443.05	$1,238.95	$204.10	$ 992.90	$ 827.35	$ 165.55	$450.15	$411.60	$ 38.55
1971–1 qtr.	$ 274.80	$ 228.50	$ 46.30	$ 181.90	$ 142.90	$ 39.00	$ 92.90	$ 85.60	$ 7.30
2	266.25	228.35	37.90	185.05	154.20	30.85	81.20	74.15	7.05
3	208.10	173.00	35.10	145.10	120.30	24.80	63.00	52.70	10.30
4	248.75	209.95	38.80	160.25	136.80	23.45	88.50	73.15	15.35
Total	$ 997.90	$ 839.80	$ 158.10	$ 672.30	$ 554.20	$ 118.10	$325.60	$285.60	$ 40.00
1972–1 qtr.	$ 215.30	$ 183.75	$ 31.55	$ 142.75	$ 121.90	$ 20.85	$ 72.55	$ 61.85	$ 10.70
2	260.60	229.55	31.05	176.75	155.65	21.10	83.85	73.90	9.95
3	236.35	209.30	27.05	172.50	151.30	21.20	63.85	58.00	5.85
4	306.45	271.75	34.70	222.45	198.30	24.15	84.00	73.45	10.55
Total	$1,018.70	$ 894.35	$ 124.35	$ 714.45	$ 627.15	$ 87.30	$304.25	$ 267.20	$ 37.05
1973–1 qtr.	$ 330.55	$ 295.05	$ 35.50	$ 239.35	$ 209.95	$ 29.40	$ 91.20	$ 85.10	$ 6.10
2	390.70	347.50	43.20	279.80	243.75	36.05	110.90	103.75	7.15
3	345.60	296.65	48.95	245.30	207.45	37.85	100.30	89.20	11.10
4	434.15	383.90	50.25	309.30	273.90	35.40	124.85	110.00	14.85
Total	$1,501.00	$ 1,323.10	$ 177.90	$1,073.75	$ 935.05	$ 138.70	$427.25	$ 388.05	$ 39.20
1974–1 qtr.	$ 433.30	$ 378.55	$ 54.75	$ 309.25	$ 269.85	$ 39.40	$124.05	$ 108.70	$ 15.35
2	525.60	464.25	61.35	368.65	323.80	44.85	156.95	140.45	16.50
3	478.15	408.80	69.35	345.70	291.00	54.70	132.45	117.80	14.65
4	593.50	511.55	81.95	422.25	356.70	65.55	171.25	154.85	16.40
Total	$2,030.55	$ 1,763.15	$ 267.40	$1,445.85	$1,241.35	$ 204.50	$584.70	$ 521.80	$ 62.90

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SHIPMENTS OF MACHINE TOOLS QUARTERLY AND YEARLY, 1975–1979

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Quarter	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1975–1 qtr.	$ 636.25	$ 526.55	$ 109.70	$ 453.80	$ 375.40	$ 78.40	$182.45	$ 151.15	$ 31.30
2	656.15	554.75	101.40	528.00	443.45	84.55	128.15	111.30	16.85
3	566.80	467.15	99.65	440.90	361.85	79.05	125.90	105.30	20.60
4	592.50	484.15	108.35	455.95	367.40	88.55	136.55	116.75	19.80
Total	$2,451.70	$ 2,032.60	$ 419.10	$1,878.65	$1,548.10	$ 330.55	$573.05	$ 484.50	$ 88.55
1976–1 qtr.	$ 531.85	$ 446.55	$ 85.30	$ 392.65	$ 334.15	$ 58.50	$139.20	$ 112.40	$ 26.80
2	517.85	425.40	92.45	367.85	302.10	65.75	150.00	123.30	26.70
3	460.35	393.45	66.90	329.95	284.85	45.10	130.40	108.60	21.80
4	549.60	477.95	71.65	391.65	348.75	42.90	157.95	129.20	28.75
Total	$2,059.65	$ 1,743.35	$ 316.30	$1,482.10	$1,269.85	$ 212.25	$577.55	$ 473.50	$104.05
1977–1 qtr.	$ 496.90	$ 433.80	$ 63.10	$ 336.10	$ 297.55	$ 38.55	$160.80	$ 136.25	$ 24.55
2	584.70	526.30	58.40	410.80	365.65	45.15	173.90	160.65	13.25
3	524.05	476.00	48.05	395.15	359.30	35.85	128.90	116.70	12.20
4	675.10	594.10	81.00	508.75	447.35	61.40	166.35	146.75	19.60
Total	$2,280.75	$ 2,030.20	$ 250.55	$1,650.80	$1,469.85	$ 180.95	$629.95	$ 560.35	$ 69.60
1978–1 qtr.	$ 683.20	$ 620.90	$ 62.30	$ 503.85	$ 459.65	$ 44.20	$ 179.35	$ 161.25	$ 18.10
2	791.60	712.55	79.05	584.20	526.95	57.25	207.40	185.60	21.80
3	687.55	609.80	77.75	498.05	438.85	59.20	189.50	170.95	18.55
4	851.10	745.35	105.75	602.40	534.65	67.75	248.70	210.70	38.00
Total	$3,013.45	$2,688.60	$ 324.85	$2,188.50	$1,960.10	$ 228.40	$ 824.95	$ 728.50	$ 96.45
1979–1 qtr.	$ 858.05	$ 769.75	$ 88.30	$ 633.45	$ 564.45	$ 69.00	$ 224.60	$ 205.30	$ 19.30
2	978.20	869.05	109.15	735.75	648.10	87.65	242.45	220.95	21.50
3	899.85	802.80	97.05	689.85	611.35	78.50	210.00	191.45	18.55
4	1,140.45	1,023.70	116.75	871.00	781.60	89.40	269.45	242.10	27.35
Total	$3,876.55	$3,465.30	$ 411.25	$2,930.05	$2,605.50	$ 324.55	$ 946.50	$ 859.80	$ 86.70

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SHIPMENTS OF MACHINE TOOLS QUARTERLY AND YEARLY, 1980–1984

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Quarter	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1980–1 qtr.	$1,146.15	$1,030.45	$ 115.70	$ 881.40	$ 794.65	$ 86.75	$ 264.75	$ 235.80	$ 28.95
2	1,193.30	1,037.75	155.55	925.35	802.50	122.85	267.95	235.25	32.70
3	1,049.05	915.20	133.85	830.45	727.80	102.65	218.60	187.40	31.20
4	1,303.25	1,100.85	202.40	1,043.60	881.05	162.55	259.65	219.80	39.85
Total	$4,691.75	$4,084.25	$ 607.50	$3,680.80	$3,206.00	$ 474.80	$1,010.95	$ 878.25	$ 132.70
1981–1 qtr.	$1,288.20	$1,077.40	$ 210.80	$1,017.85	$ 862.25	$ 155.60	$ 270.35	$ 215.15	$ 55.20
2	1,367.50	1,131.15	236.35	1,103.40	917.95	185.45	264.10	213.20	50.90
3	1,133.95	1,006.00	127.95	920.30	820.35	99.95	213.65	185.65	28.00
4	1,305.95	1,162.10	143.85	1,062.95	951.90	111.05	243.00	210.20	32.80
Total	$5,095.60	$4,376.65	$ 718.95	$4,104.50	$3,552.45	$ 552.05	$ 991.10	$ 824.20	$ 166.90
1982–1 qtr.	$1,154.20	$1,041.55	$ 112.65	$ 933.05	$ 861.30	$ 71.75	$ 221.15	$ 180.25	$ 40.90
2	1,008.45	911.85	96.60	810.65	735.30	75.35	197.80	176.55	21.25
3	783.40	676.20	107.20	640.45	550.70	89.75	142.95	125.50	17.45
4	658.35	568.75	89.60	510.60	451.30	59.30	147.75	117.45	30.30
Total	$3,604.40	$3,198.35	$ 406.05	$2,894.75	$2,598.60	$ 296.15	$ 709.65	$ 599.75	$ 109.90
1983–1 qtr.	$ 487.45	$ 430.80	$ 56.65	$ 370.60	$ 329.80	$ 40.80	$ 116.85	$ 101.00	$ 15.85
2	469.65	411.35	58.30	357.50	308.20	49.30	112.15	103.15	9.00
3	357.05	314.15	42.90	252.35	220.15	32.20	104.70	94.00	10.70
4	530.90	473.75	57.15	391.05	341.45	49.60	139.85	132.30	7.55
Total	$1,845.05	$1,630.05	$ 215.00	$1,371.50	$1,199.60	$ 171.90	$ 473.55	$ 430.45	$ 43.10
1984–1 qtr.	$ 449.50	$ 408.95	$ 40.55	$ 298.10	$ 273.00	$ 25.10	$ 151.40	$ 135.95	$ 15.45
2	572.30	521.60	50.70	401.80	373.55	28.25	170.50	148.05	22.45
3	568.85	527.00	41.85	401.55	377.25	24.30	167.30	149.75	17.55
4	695.20	635.05	60.15	505.05	460.05	45.00	190.15	175.00	15.15
Total	$2,285.85	$2,092.60	$ 193.25	$1,606.50	$1,483.85	$ 122.65	$ 679.35	$ 608.75	$ 70.60

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SHIPMENTS OF MACHINE TOOLS QUARTERLY AND YEARLY, 1985 TO DATE

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Quarter	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1985–1 qtr.	$ 531.70	$ 482.75	$ 48.95	$ 357.05	$ 319.90	$ 37.15	$ 174.65	$ 162.85	$ 11.80
2	586.05	548.35	37.70	385.00	357.55	27.45	201.05	190.80	10.25
3	654.65	596.40	58.25	443.05	407.10	35.95	211.60	189.30	22.30
4	772.80	663.95	108.85	557.15	463.95	93.20	215.65	200.00	15.65
Total	$2,545.20	$2,291.45	$ 253.75	$1,742.25	$1,548.50	$ 193.75	$ 802.95	$ 742.95	$ 60.00
1986–1 qtr.	$ 597.30	$ 529.80	$ 67.50	$ 386.95	$ 331.75	$ 55.20	$ 210.35	$ 198.05	$ 12.30
2	751.00	686.90	64.10	569.35	519.85	49.50	181.65	167.05	14.60
3	549.35	485.15	64.20	418.70	369.20	49.50	130.65	115.95	14.70
4	680.85	604.20	76.65	515.30	463.90	51.40	165.55	140.30	25.25
Total	$2,578.50	$2,306.05	$ 272.45	$1,890.30	$1,684.70	$ 205.60	$ 688.20	$ 621.35	$ 66.85
1987–1 qtr.	$ 476.80	$ 420.85	$ 55.95	$ 349.15	$ 311.10	$ 38.05	$ 127.65	$ 109.75	$ 17.90
2	614.10	542.80	71.30	442.60	396.30	46.30	171.50	146.50	25.00
3	556.65	490.35	66.30	397.75	354.40	43.35	158.90	135.95	22.95
4	676.10	582.75	93.35	487.00	437.05	49.95	189.10	145.70	43.40
Total	$2,323.65	$2,036.75	$ 286.90	$1,676.50	$1,498.85	$ 177.65	$ 547.15	$ 537.90	$ 109.25
1988–1 qtr.	$ 516.50	$ 456.50	$ 60.00	$ 317.85	$ 282.55	$ 35.30	$ 198.65	$ 173.95	$ 24.70
2	551.15	476.75	74.40	339.35	298.45	40.90	211.80	178.30	33.50
3	569.20	502.85	66.35	391.30	352.65	38.65	177.90	150.20	27.70
4	762.25	666.20	96.05	526.05	466.45	59.60	236.20	199.75	36.45
Total	$2,399.10	$2,102.30	$ 296.80	$1,574.55	$1,400.10	$ 174.45	$ 824.55	$ 702.20	$ 122.35
1989–1 qtr.	$ 687.65	$ 606.25	$ 81.40	$ 481.55	$ 430.65	$ 50.90	$ 206.10	$ 175.60	$ 30.50
2	817.85	716.70	101.15	578.15	513.70	64.45	239.70	203.00	36.70
3	745.50	636.15	109.35	574.00	491.40	82.60	171.50	144.75	26.75
4	944.60	804.25	140.35	724.90	623.45	101.45	219.70	180.80	38.90
Total	$3,195.60	$2,763.35	$ 432.25	$2,358.60	$2,059.20	$ 299.40	$ 837.00	$ 704.15	$ 132.85
1990–1 qtr.	$ 783.25	$ 678.60	$ 104.65	$ 545.85	$ 466.80	$ 79.05	$ 237.40	$ 211.80	$ 25.60

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SHIPMENTS OF MACHINE TOOLS MONTHLY, 1985 –1987

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Month	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1985									
January	$ 137.80	$126.55	$11.25	$ 89.75	$ 80.60	$ 9.15	$ 48.05	$ 45.95	$ 2.10
February	166.25	151.65	14.60	108.30	98.95	9.35	57.95	52.70	5.25
March	227.65	204.55	23.10	159.00	140.35	18.65	68.65	64.20	4.45
April	169.75	161.80	7.95	103.15	98.15	5.00	66.60	63.65	2.95
May	177.30	163.80	13.50	118.85	110.00	8.85	58.45	53.80	4.65
June	239.00	222.75	16.25	163.00	149.40	13.60	76.00	73.35	2.65
July	194.80	174.55	20.25	125.05	111.30	13.75	69.75	63.25	6.50
August	215.90	201.05	14.85	143.05	137.20	5.85	72.85	63.85	9.00
September	243.95	220.80	23.15	174.95	158.60	16.35	69.00	62.20	6.80
October	199.30	178.65	20.65	129.90	114.05	15.85	69.40	64.60	4.80
November	199.15	179.25	19.90	139.40	126.35	13.05	59.75	52.90	6.85
December	374.35	306.05	68.30	287.85	223.55	64.30	86.50	82.50	4.00
1986									
January	145.85	124.85	21.00	91.50	74.05	17.45	54.35	50.80	3.55
February	202.65	185.65	17.00	123.90	109.50	14.40	78.75	76.15	2.60
March	248.80	219.30	29.50	171.55	148.20	23.35	77.25	71.10	6.15
April	209.55	190.80	18.75	152.10	140.05	12.05	57.45	50.75	6.70
May	229.55	207.10	22.45	172.45	153.10	19.35	57.10	54.00	3.10
June	311.90	289.00	22.90	244.80	226.70	18.10	67.10	62.30	4.80
July	190.05	172.50	17.55	149.10	135.90	13.20	40.95	36.60	4.35
August	151.35	131.55	19.80	108.25	92.50	15.75	43.10	39.05	4.05
September	207.95	181.10	26.85	161.35	140.80	20.55	46.60	40.30	6.30
October	242.80	222.80	20.00	183.50	170.40	13.10	59.30	52.40	6.90
November	166.80	149.10	17.70	116.80	104.40	12.40	50.00	44.70	5.30
December	271.25	232.30	38.95	215.00	189.10	25.90	56.25	43.20	13.05
1987									
January	147.70	135.35	12.35	111.25	104.10	7.15	36.45	31.25	5.20
February	146.60	131.45	15.15	99.25	88.80	10.45	47.35	42.65	4.70
March	182.50	154.05	28.45	138.65	118.20	20.45	43.85	35.85	8.00
April	172.35	150.15	22.20	115.85	102.10	13.75	56.50	48.05	8.45
May	208.60	189.80	18.80	161.65	146.00	15.65	46.95	43.80	3.15
June	233.15	202.85	30.30	165.10	148.20	16.90	68.05	54.65	13.40
July	197.80	182.25	15.55	136.30	127.90	8.40	61.50	54.35	7.15
August	158.40	133.45	24.95	118.35	99.85	18.50	40.05	33.60	6.45
September	200.45	174.65	25.80	143.10	126.65	16.45	57.35	48.00	9.35
October	209.65	181.20	28.45	134.85	117.95	16.90	74.80	63.25	11.55
November	178.05	148.60	29.45	125.95	110.20	15.75	52.10	38.40	13.70
December	288.40	252.95	35.45	226.20	208.90	17.30	62.20	44.05	18.15

SHIPMENTS OF MACHINE TOOLS MONTHLY, 1988 –1990

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Month	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1988									
January	$143.35	$125.65	$17.70	$ 71.20	$ 61.60	$ 9.60	$72.15	$64.05	$8.10
February	166.45	145.10	21.35	108.90	97.00	11.90	57.55	48.10	9.45
March	206.70	185.75	20.95	137.75	123.95	13.80	68.95	61.80	7.15
April	157.40	133.90	23.50	95.30	82.20	13.10	62.10	51.70	10.40
May	179.70	157.60	22.10	111.25	100.25	11.00	68.45	57.35	11.10
June	214.05	185.25	28.80	132.80	116.00	16.80	81.25	69.25	12.00
July	187.70	169.90	17.80	134.70	126.15	8.55	53.00	43.75	9.25
August	153.95	133.75	20.20	105.40	93.00	12.40	48.55	40.75	7.80
September	227.55	199.20	28.35	151.20	133.50	17.70	76.35	65.70	10.65
October	212.15	178.65	33.50	145.90	123.35	22.55	66.25	55.30	10.95
November	257.55	236.85	20.70	170.80	156.70	14.10	86.75	80.15	6.60
December	292.55	250.70	41.85	209.35	186.40	22.95	83.20	64.30	18.90
1989									
January	152.20	131.70	20.50	102.85	89.50	13.35	49.35	42.20	7.15
February	228.80	200.30	28.50	151.25	133.90	17.35	77.55	66.40	11.15
March	306.65	274.25	32.40	227.45	207.25	20.20	79.20	67.00	12.20
April	249.55	227.15	22.40	184.05	168.35	15.70	65.50	58.80	6.70
May	240.75	219.50	21.25	158.40	145.40	13.00	82.35	74.10	8.25
June	327.55	270.05	57.50	235.70	199.95	35.75	91.85	70.10	21.75
July	237.70	206.00	31.70	175.60	155.45	20.15	62.10	50.55	11.55
August	225.80	196.95	28.85	169.90	147.20	22.70	55.90	49.75	6.15
September	282.00	233.20	48.80	228.50	188.75	39.75	53.50	44.45	9.05
October	251.55	220.75	30.80	183.55	161.95	21.60	68.00	58.80	9.20
November	313.70	265.25	48.45	228.60	201.10	27.50	85.10	64.15	20.95
December	379.35	318.25	61.10	312.75	260.40	52.35	66.60	57.85	8.75
1990									
January	226.35	199.05	27.30	162.20	143.40	18.80	64.15	55.65	8.50
February	268.00	233.30	34.70	169.50	143.60	25.90	98.50	89.70	8.80
March	288.90	246.25	42.65	214.15	179.80	34.35	74.75	66.45	8.30
April	258.10	218.35	39.75	168.95	141.65	27.30	89.15	76.70	12.45
May	272.60	242.95	29.65	193.80	171.95	21.85	78.80	71.00	7.80

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NET NEW ORDERS FOR MACHINE TOOLS, 1960 TO DATE

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Year	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1960	$ 744	$ 527	$ 217	$ 535	$ 375	$ 160	$ 209	$ 152	$ 57
1961	772	536	236	591	401	190	181	135	46
1962	815	661	154	571	468	103	244	193	51
1963	1,061	869	192	760	607	153	301	262	39
1964	1,577	1,348	229	1,038	861	177	539	487	52
1965	1,692	1,532	160	1,251	1,122	129	441	410	31
1966	2,074	1,884	190	1,629	1,483	146	445	401	44
1967	1,420	1,272	148	1,134	1,024	110	286	248	38
1968	1,474	1,320	154	1,080	960	120	394	360	34
1969	1,728	1,517	211	1,195	1,033	162	533	484	49
1970	912	733	179	651	507	144	261	226	35
1971	861	747	114	609	524	85	252	223	29
1972	1,412	1,245	167	1,009	877	132	403	368	35
1973	2,613	2,268	345	1,825	1,550	275	787	717	70
1974	2,583	2,185	398	2,017	1,716	301	566	470	96
1975	1,277	1,064	213	916	781	135	361	284	77
1976	2,203	1,961	242	1,662	1,477	185	541	485	56
1977	2,995	2,709	286	2,202	1,961	221	793	729	64
1978	4,349	3,944	405	3,375	3,043	332	973	901	72
1979	5,621	4,856	765	4,495	3,866	629	1,126	991	135
1980	4,754	4,239	515	3,885	3,496	389	870	744	126
1981	2,945	2,563	382	2,228	1,946	282	717	617	100
1982	1,498	1,261	236	1,064	890	175	433	372	62
1983	1,696	1,558	138	1,152	1,069	82	545	489	56
1984	2,916	2,631	285	1,916	1,700	216	1,000	932	69
1985	2,528	2,262	266	1,853	1,652	201	675	610	65
1986	2,125	1,883	242	1,544	1,377	168	581	507	74
1987	2,119	1,831	288	1,451	1,294	157	667	536	131
1988	3,591	3,065	526	2,708	2,316	392	883	749	134
1989	2,808	2,442	366	1,977	1,723	254	832	719	113

NET NEW ORDERS FOR MACHINE TOOLS QUARTERLY AND YEARLY, 1970–1974

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Quarter	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1970–1 qtr.	$ 305.40	$ 256.65	$ 48.75	$ 231.05	$ 191.30	$ 39.75	$ 74.35	$ 65.35	$ 9.00
2	231.65	185.55	46.10	173.80	131.95	41.85	57.85	53.60	4.25
3	192.15	150.40	41.75	141.05	106.90	34.15	51.10	43.50	7.60
4	183.35	140.75	42.60	105.40	76.60	28.80	77.95	64.15	13.80
Total	$ 912.55	$ 733.35	$ 179.20	$ 651.30	$ 506.75	$ 144.55	$261.25	$ 226.60	$ 34.65
1971–1 qtr.	$ 181.55	$ 151.00	$ 30.55	$ 118.75	$ 95.50	$ 23.25	$ 62.80	$ 55.50	$ 7.30
2	212.40	182.25	30.15	153.35	128.80	24.55	59.05	53.45	5.60
3	231.55	204.10	27.45	165.40	144.50	20.90	66.15	59.60	6.55
4	235.65	209.95	25.70	171.25	155.30	15.95	64.40	54.65	9.75
Total	$ 861.15	$ 747.30	$ 113.85	$ 608.75	$ 524.10	$ 84.65	$252.40	$ 223.20	$ 29.20
1972–1 qtr.	$ 275.60	$ 242.05	$ 33.55	$ 207.65	$ 180.55	$ 27.10	$ 67.95	$ 61.50	$ 6.45
2	319.65	284.75	34.90	222.15	193.80	28.35	97.50	90.95	6.55
3	353.10	301.55	51.55	253.70	210.90	42.80	99.40	90.65	8.75
4	463.65	417.10	46.55	325.45	292.00	33.45	138.20	125.10	13.10
Total	$1,412.00	$1,245.45	$ 166.55	$1,008.95	$ 877.25	$ 131.70	$403.05	$ 368.20	$ 34.85
1973–1 qtr.	$ 632.00	$ 558.15	$ 73.85	$ 426.00	$ 370.15	$ 55.85	$206.00	$ 188.00	$ 18.00
2	678.10	610.55	67.55	448.00	395.45	52.55	230.10	215.10	15.00
3	600.10	512.85	87.25	427.35	358.45	68.90	172.75	154.40	18.35
4	702.45	586.05	116.40	524.10	426.35	97.75	178.35	159.70	18.65
Total	$2,612.65	$2,267.60	$ 345.05	$1,825.45	$1,550.40	$ 275.05	$787.20	$ 717.20	$ 70.00
1974–1 qtr.	$ 752.20	$ 644.50	$ 107.70	$ 597.85	$ 509.75	$ 88.10	$154.35	$ 134.75	$ 19.60
2	847.85	737.95	109.90	676.20	592.55	83.65	171.65	145.40	26.25
3	631.50	536.30	95.20	465.00	394.10	70.90	166.50	142.20	24.30
4	351.50	266.50	85.00	278.00	219.25	58.75	73.50	47.25	26.25
Total	$2,583.05	$2,185.25	$ 397.80	$2,017.05	$1,715.65	$ 301.40	$566.00	$ 469.60	$ 96.40

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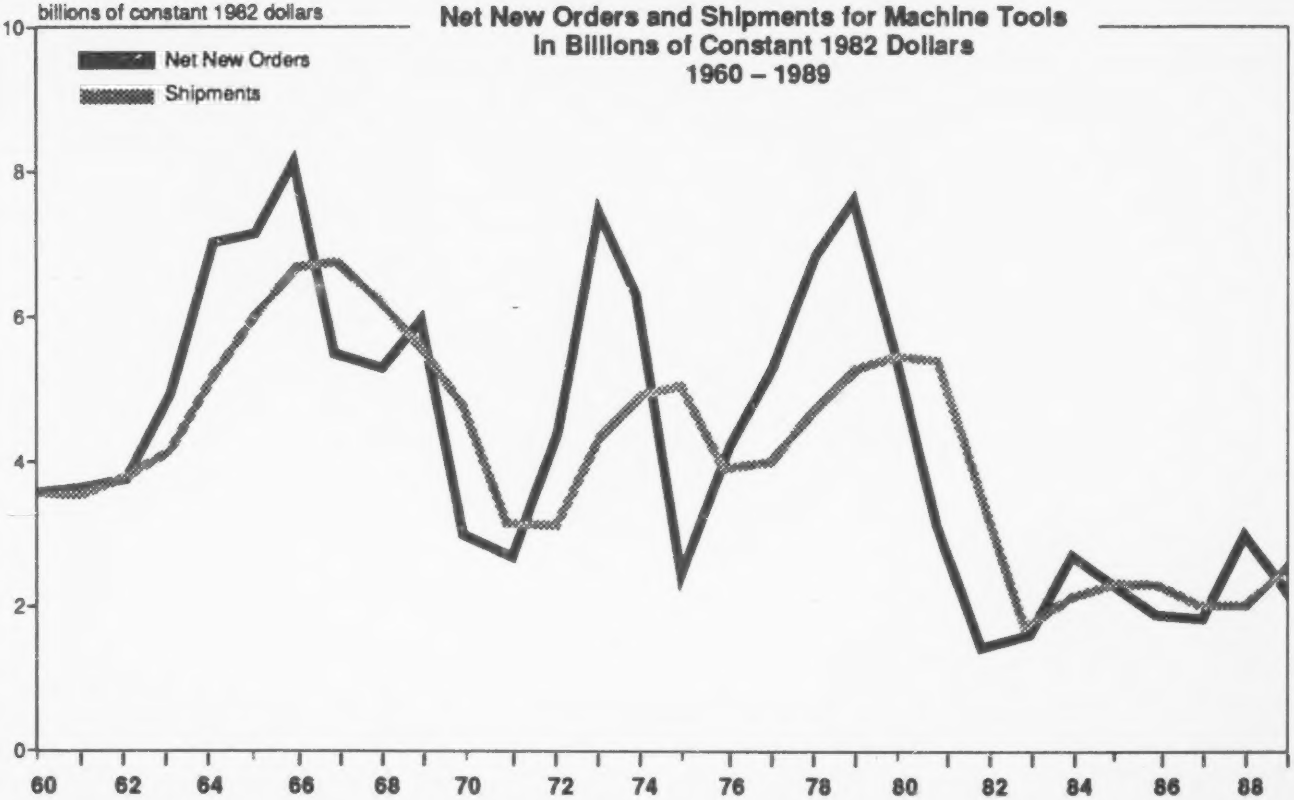

Net New Orders and Shipments for Machine Tools in Billions of Constant 1982 Dollars 1960 – 1989

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NET NEW ORDERS FOR MACHINE TOOLS QUARTERLY AND YEARLY, 1975–1979

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Quarter	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1975–1 qtr.	$ 237.60	$ 188.35	$ 49.25	$ 176.25	$ 147.70	$ 28.55	$ 61.35	$ 40.65	$ 20.70
2	345.75	276.80	68.95	240.85	201.05	39.80	104.90	75.75	29.15
3	340.45	293.75	46.70	241.35	209.60	31.75	99.10	84.15	14.95
4	352.95	305.15	47.80	257.45	222.15	35.30	95.50	83.00	12.50
Total	$1,276.75	$1,064.05	$ 212.70	$ 915.90	$ 780.50	$ 135.40	$360.85	$ 283.55	$ 77.30
1976–1 qtr.	$ 413.30	$ 354.50	$ 58.80	$ 305.75	$ 259.95	$ 45.80	$107.55	$ 94.55	$ 13.00
2	496.60	452.70	43.90	354.05	322.70	31.35	142.55	130.00	12.55
3	597.30	527.80	69.50	439.40	383.50	55.90	157.90	144.30	13.60
4	696.00	626.45	69.55	562.95	510.45	52.50	133.05	116.00	17.05
Total	$2,203.20	$1,961.45	$ 241.75	$1,662.15	$1,476.60	$ 185.55	$541.05	$ 484.85	$ 56.20
1977–1 qtr.	$ 667.45	$ 603.90	$ 63.55	$ 489.00	$ 443.85	$ 45.15	$178.45	$ 160.05	$ 18.40
2	770.55	692.25	78.30	583.70	522.60	61.10	186.85	169.65	17.20
3	725.85	650.70	75.15	496.20	435.30	60.90	229.65	215.40	14.25
4	831.50	762.80	68.70	633.15	578.95	54.20	198.35	183.85	14.50
Total	$2,995.35	$2,709.65	$ 285.70	$2,202.05	$1,980.70	$ 221.35	$793.30	$ 728.95	$ 64.35
1978–1 qtr.	$ 940.05	$ 847.30	$ 92.75	$ 723.85	$ 646.25	$ 77.60	$ 216.20	$ 201.05	$ 15.15
2	1,129.95	1,013.25	116.70	886.55	789.55	97.00	243.40	223.70	19.70
3	1,027.65	953.85	73.80	776.95	720.70	56.25	250.70	233.15	17.55
4	1,250.85	1,129.70	121.15	988.10	886.65	101.45	262.75	243.05	19.70
Total	$4,348.50	$3,944.10	$ 404.40	$3,375.45	$3,043.15	$ 332.30	$ 973.05	$ 900.95	$ 72.10
1979–1 qtr.	$1,471.40	$1,322.80	$ 148.60	$1,158.25	$1,031.55	$ 126.70	$ 313.15	$ 291.25	$ 21.90
2	1,356.45	1,189.00	167.45	1,083.55	963.30	120.25	272.90	225.70	47.20
3	1,353.20	1,171.85	181.35	1,120.50	969.40	151.10	232.70	202.45	30.25
4	1,440.40	1,172.85	267.55	1,132.80	901.55	231.25	307.60	271.30	36.30
Total	$5,621.45	$4,856.50	$ 764.95	$4,495.10	$3,865.80	$ 629.30	$1,126.35	$ 990.70	$135.65

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NET NEW ORDERS FOR MACHINE TOOLS QUARTERLY AND YEARLY, 1980–1984

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Quarter	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1980–1 qtr.	$1,517.45	$1,331.95	$ 185.50	$1,207.80	$1,057.90	$ 149.90	$ 309.65	$ 274.05	$ 35.60
2	1,335.35	1,210.05	125.30	1,142.10	1,054.30	87.80	193.25	155.75	37.50
3	917.50	825.35	92.15	728.30	659.05	69.25	189.20	166.30	22.90
4	984.00	872.20	111.80	806.55	724.25	82.30	177.45	147.95	29.50
Total	$4,754.30	$4,239.55	$ 514.75	$3,884.75	$3,495.50	$ 389.25	$ 869.55	$ 744.05	$ 125.50
1981–1 qtr.	$ 920.35	$ 809.95	$ 110.40	$ 706.60	$ 615.25	$ 91.35	$ 213.75	$ 194.70	$ 19.05
2	867.00	723.60	143.40	661.20	559.95	101.25	205.80	163.65	42.15
3	593.45	530.65	62.80	455.25	408.10	47.15	138.20	122.55	15.65
4	564.05	498.45	65.60	405.05	362.50	42.55	159.00	135.95	23.05
Total	$2,944.85	$2,562.65	$ 382.20	$2,228.10	$1,945.80	$ 282.30	$ 716.75	$ 616.85	$ 99.90
1982–1 qtr.	$ 506.80	$ 432.30	$ 74.50	$ 384.85	$ 328.40	$ 56.45	$ 121.95	$ 103.90	$ 18.05
2	382.65	303.05	79.60	274.75	216.45	58.30	107.90	86.60	21.30
3	279.95	237.30	42.65	183.45	154.00	29.45	96.50	83.30	13.20
4	328.35	288.70	39.65	221.40	190.75	30.65	106.95	97.95	9.00
Total	$1,497.75	$ 1,261.35	$ 236.40	$1,064.45	$ 889.60	$ 174.85	$ 433.30	$ 371.75	$ 61.55
1983–1 qtr.	$ 314.85	$ 285.55	$ 29.30	$ 224.10	$ 205.85	$ 18.25	$ 90.75	$ 79.70	$ 11.05
2	399.10	366.70	32.40	269.30	250.30	19.00	129.80	116.40	13.40
3	468.15	439.45	28.70	322.20	305.90	16.30	145.95	133.55	12.40
4	514.05	466.50	47.55	336.05	307.40	28.65	178.00	159.10	18.90
Total	$1,696.15	$1,558.20	$ 137.95	$1,151.65	$1,069.45	$ 82.20	$ 544.50	$ 488.75	$ 55.75
1984–1 qtr.	$ 600.45	$ 551.90	$ 48.55	$ 412.75	$ 376.10	$ 36.65	$ 187.70	$ 175.80	$ 11.90
2	764.40	654.65	109.75	499.20	410.75	88.45	265.20	243.90	21.30
3	800.20	734.95	65.25	493.00	439.15	53.85	307.20	295.80	11.40
4	750.75	689.55	61.20	510.85	473.55	37.30	239.90	216.00	23.90
Total	$2,915.80	$2,631.05	$ 284.75	$1,915.80	$1,699.55	$ 216.25	$1,000.00	$ 931.50	$ 68.50

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NET NEW ORDERS FOR MACHINE TOOLS QUARTERLY AND YEARLY, 1985–1990

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Quarter	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1985–1 qtr.	$ 728.25	$ 663.25	$ 65.00	$ 528.50	$ 475.50	$ 53.00	$ 199.65	$ 187.65	$ 12.00
2	641.40	582.45	58.95	475.70	430.15	45.55	165.70	152.30	13.40
3	558.45	465.35	93.10	404.75	338.80	65.95	153.70	126.55	27.15
4	600.00	551.10	48.90	444.15	407.70	36.45	155.85	143.40	12.45
Total	$2,528.10	$2,262.15	$ 265.95	$1,853.10	$1,652.15	$ 200.95	$ 675.00	$ 610.00	$ 65.00
1986–1 qtr.	$ 615.75	$ 570.00	$ 45.75	$ 463.50	$ 431.45	$ 32.05	$ 152.25	$ 138.55	$ 13.70
2	600.60	536.80	63.80	434.65	382.45	52.20	165.95	154.35	11.60
3	459.65	387.90	71.75	344.05	297.80	46.25	115.60	90.10	25.50
4	449.30	388.65	60.65	302.05	264.85	37.20	147.25	123.80	23.45
Total	$2,125.30	$1,883.35	$ 241.95	$1,544.25	$1,376.55	$ 167.70	$ 581.05	$ 506.80	$ 74.25
1987–1 qtr.	$ 463.70	$ 396.25	$ 67.45	$ 326.10	$ 291.55	$ 34.55	$ 137.60	$ 104.70	$ 32.90
2	521.15	463.55	57.60	339.30	303.60	35.70	181.85	159.95	21.90
3	487.85	412.45	75.40	324.55	291.60	32.95	163.30	120.85	42.45
4	646.10	558.25	87.85	461.50	407.70	53.80	184.60	150.55	34.05
Total	$2,118.80	$1,830.50	$ 288.30	$1,451.45	$1,294.45	$ 157.00	$ 667.35	$ 536.05	$ 131.30
1988–1 qtr.	$ 850.00	$ 746.95	$ 103.05	$ 666.25	$ 597.85	$ 68.40	$ 183.75	$ 149.10	$ 34.65
2	960.50	817.60	142.90	676.50	562.75	113.75	284.00	254.85	29.15
3	922.65	778.75	143.90	715.00	599.80	115.20	207.65	178.95	28.70
4	857.70	721.80	135.90	650.15	555.35	94.80	207.55	166.45	41.10
Total	$3,590.85	$3,065.10	$ 525.75	$2,707.90	$2,315.75	$ 392.15	$ 882.95	$ 749.35	$ 133.60
1989–1 qtr.	$ 803.30	$ 708.75	$ 94.55	$ 602.55	$ 536.90	$ 65.65	$ 200.75	$ 171.85	$ 28.90
2	688.50	598.75	89.75	459.55	399.65	59.90	228.95	199.10	29.85
3	720.45	626.00	94.45	481.90	407.20	74.70	238.55	218.80	19.75
4	595.70	508.35	87.35	432.35	379.05	53.30	163.35	129.30	34.05
Total	$2,807.95	$2,441.85	$ 366.10	$1,976.35	$1,722.80	$ 253.55	$ 831.60	$ 719.05	$ 112.55
1990–1 qtr.	$ 661.70	$ 505.90	$ 155.80	$ 455.65	$ 350.75	$ 104.90	$ 206.05	$ 155.15	$ 50.90

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NET NEW ORDERS OF MACHINE TOOLS MONTHLY, 1985 –1987

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Month	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1985									
January	$211.45	$195.90	$15.55	$137.75	$124.75	$13.00	$73.70	$71.15	$2.55
February	237.50	217.60	19.90	163.75	148.05	15.70	73.75	69.55	4.20
March	279.30	249.75	29.55	227.00	202.70	24.30	52.30	47.05	5.25
April	183.50	170.15	13.35	122.10	112.85	9.25	61.40	57.30	4.10
May	222.70	203.80	18.90	170.75	157.35	13.40	51.95	46.45	5.50
June	235.20	208.50	26.70	182.85	159.95	22.90	52.35	48.55	3.80
July	199.85	157.90	41.95	149.85	114.85	35.00	50.00	43.05	6.95
August	184.50	162.60	21.90	130.80	115.70	15.10	53.70	46.90	6.80
September	174.10	144.85	29.25	124.10	108.25	15.85	50.00	36.60	13.40
October	229.85	204.20	25.65	156.00	134.95	21.05	73.85	69.25	4.60
November	195.10	183.65	11.45	171.55	162.70	8.85	23.55	20.95	2.60
December	175.05	163.25	11.80	116.60	110.05	6.55	58.45	53.20	5.25
1986									
January	190.75	174.95	15.80	135.00	124.75	10.25	55.75	50.20	5.55
February	210.40	198.25	12.15	168.60	160.65	7.95	41.80	37.60	4.20
March	214.60	196.80	17.80	159.90	146.05	13.85	54.70	50.75	3.95
April	193.25	169.25	24.00	136.15	118.30	17.85	57.10	50.95	6.15
May	206.20	177.00	29.20	141.70	118.50	23.20	64.50	58.50	6.00
June	201.15	190.55	10.60	156.80	145.65	11.15	44.35	44.90	–0.55
July	170.00	135.30	34.70	128.80	99.25	29.55	41.20	36.05	5.15
August	154.40	139.00	15.40	115.10	108.60	6.50	39.30	30.40	8.90
September	135.25	113.60	21.65	100.15	89.95	10.20	35.10	23.65	11.45
October	180.15	159.40	20.75	130.85	114.95	15.90	49.30	44.45	4.85
November	132.60	118.15	14.45	83.95	75.85	8.10	48.65	42.30	6.35
December	136.55	111.10	25.45	87.25	74.05	13.20	49.30	37.05	12.25
1987									
January	146.65	118.55	28.10	98.95	85.65	13.30	47.70	32.90	14.80
February	152.85	141.45	11.40	103.70	98.35	5.35	49.15	43.10	6.05
March	164.20	136.25	27.95	123.45	107.55	15.90	40.75	28.70	12.05
April	130.30	110.15	20.15	79.55	65.15	14.40	50.75	45.00	5.75
May	188.10	176.10	12.00	144.80	139.60	5.20	43.30	36.50	6.80
June	202.75	177.30	25.45	114.95	98.85	16.10	87.80	78.45	9.35
July	163.00	128.50	34.50	102.10	84.60	17.50	60.90	43.90	17.00
August	142.00	126.85	15.15	96.35	90.25	6.10	45.65	36.60	9.05
September	182.85	157.10	25.75	126.10	116.75	9.35	56.75	40.35	16.40
October	267.40	246.70	20.70	198.15	187.15	11.00	69.25	59.55	9.70
November	137.30	102.10	35.20	89.10	65.75	23.35	48.20	36.35	11.85
December	241.40	209.45	31.95	174.25	154.80	19.45	67.15	54.65	12.50

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NET NEW ORDERS OF MACHINE TOOLS MONTHLY, 1988 –1990

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Month	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
1988									
January	$297.50	$266.05	$31.45	$223.95	$205.75	$18.20	$73.55	$60.30	$13.25
February	298.05	258.85	39.20	250.40	217.85	32.45	47.65	40.90	6.75
March	254.45	222.05	32.40	191.90	174.15	17.75	62.55	47.90	14.65
April	253.00	193.45	59.55	195.30	146.45	48.45	57.70	47.00	10.70
May	324.70	278.90	45.80	242.85	205.65	37.20	81.85	73.25	8.60
June	382.80	345.25	37.55	238.35	210.65	27.70	144.45	134.60	9.85
July	254.95	221.35	33.60	187.00	167.55	19.45	67.95	53.80	14.15
August	339.50	252.80	86.70	261.50	179.30	82.20	78.00	73.50	4.50
September	328.20	304.60	23.60	266.50	252.95	13.55	61.70	51.65	10.05
October	262.25	239.25	23.00	215.40	199.25	16.15	46.85	40.00	6.85
November	279.00	230.85	48.15	188.35	164.60	23.75	90.65	66.25	24.40
December	316.45	251.70	64.75	246.40	191.50	54.90	70.05	60.20	9.85
1989									
January	230.85	202.00	28.85	167.00	145.40	21.60	63.85	56.60	7.25
February	281.95	248.35	33.60	214.95	191.30	23.65	67.00	57.05	9.95
March	290.50	258.40	32.10	220.60	200.20	20.40	69.90	58.20	11.70
April	242.55	214.90	27.65	152.80	138.50	14.30	89.75	76.40	13.35
May	205.25	187.95	17.30	147.90	138.10	9.80	57.35	49.85	7.50
June	240.70	195.90	44.80	158.85	123.05	35.80	81.85	72.85	9.00
July	190.75	155.35	35.40	133.20	112.00	21.20	57.55	43.35	14.20
August	227.10	191.15	35.95	156.25	120.70	35.55	70.85	70.45	0.40
September	302.60	279.50	23.10	192.45	174.50	17.95	110.15	105.00	5.15
October	205.00	182.75	22.25	144.90	135.70	9.20	60.10	47.05	13.05
November	184.40	148.20	36.20	128.90	108.15	20.75	55.50	40.05	15.45
December	206.30	177.40	28.90	158.55	135.20	23.35	47.75	42.20	5.55
1990									
January	201.30	159.20	42.10	141.15	117.70	23.45	60.15	41.50	18.65
February	194.55	157.15	37.40	116.30	100.45	15.85	78.25	56.70	21.55
March	265.85	189.55	76.30	198.20	132.60	65.60	67.65	56.95	10.70
April	289.25	264.70	24.55	206.65	187.45	19.20	82.60	77.25	5.35
May	206.20	181.05	25.15	137.55	116.55	21.00	68.65	64.50	4.15

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UNFILLED ORDERS 1970 TO DATE

Metal Cutting and Metal Forming Machine Tools

(millions of dollars)

Year	Total	Metal Cutting	Metal Forming
1970	$ 706	$ 471	$ 228
1971	569	408	162
1972	963	702	621
1973	2,074	1,454	621
1974	2,625	2,025	600
1975	1,450	1,062	388
1976	1,594	1,243	351
1977	2,308	1,795	515
1978	3,643	2,981	663
1979	5,388	4,546	843
1980	5,451	4,750	701
1981	3,300	2,873	427
1982	1,194	1,043	151
1983	1,045	823	222
1984	1,675	1,132	542
1985	1,658	1,243	414
1986	1,204	897	307
1987	1,000	672	327
1988	2,191	1,806	386
1989	1,804	1,423	380

Technical Publications

NMTBA offers a series of technical publications that contain suggestions, guidelines and information to make your company's operation more efficient and productive.

1 Guidelines for the Measurement of Machine Tool Utilization

This publication suggests a uniform procedure for the measurement and reporting of machine tool utilization. It provides a system to measure the effectiveness of a wide variety of machines and their related resources. It establishes indices of production, availability, utilization and consistent methods for their evaluation.

2 Definition and Evaluation of Accuracy and Repeatability of NC Machine Tools

This publication was prepared to help develop a better understanding of the accuracy and repeatability of numerically controlled machine tools. Definitions, methods of computation and testing procedures are thoroughly discussed. This paper is recognized in the COCOM (Coordinating Committee) Regulations which govern the export licensing of NC machine tools.

3 Bibliography of Numerical Control Standards and Related Publications

This listing of Numerical Control (NC) standards and related publications offers information on the availability, scope, purpose and source of each. This document can be of considerable value to both the manufacturer and the user of numerically controlled machine tools.

4 NC Is EZ

This publication is intended as a practical and easy to understand NC primer. It will help prospective first-time NC users plan and execute the installation and start-up of new equipment with a minimum of difficulty.

5 Definition and Evaluation of Accuracy Noise Measurement Techniques

This publication suggests the most recent measuring techniques and procedures for the determination of machine tool sound. A discussion of time-weighted average sound levels is included as well as a discussion of the disagreement between OSHA and EPA as to the basis for computing noise dosage.

6 Guidelines For Quality Systems in Machine Tool and Related Industries

This document assists NMTBA member companies in establishing their individual Quality Systems. The Guidelines suggests the necessary essential elements of quality systems and their mutual relationships, stressing waste elimination and defect prevention through continuous monitoring of compliance to customer requirements, and the use of feedback to affect a cycle of Continuous Quality Improvement.

7 Common Words As They Relate to NC Software

The aim of this publication is to improve communications among those involved with NC computer software. It defines the common terms used throughout the industry including those regarding the preparation and use of computer software for numerically controlled machine tools.

8 Machine Tool Standards Index

A bibliography of standards pertinent to the design, manufacture, sale and use of machine tools.

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MACHINE TOOLS AND THE U.S. MACHINE TOOL INDUSTRY

A **machine tool** is a power–driven machine, not hand–held, that is used to cut, form, or shape metal. Machine tools are typically installed as capital equipment in metalworking industries. Few if any products or services of an industrialized country would exist were it not for machine tools.

Production of automobiles, airplanes, home appliances, power plants, agricultural machinery, and most other products would be impossible without machine tools. Yet, because of their efficiency and longevity, machine tools themselves represent just a small part of the nation's output. If the entire U.S. machine tool industry was ranked by its 1989 shipments, it would be listed no higher than 132nd on the Fortune 500 of top companies by sales.

The industry is classified into two major industry subgroupings: Standard industrial classification code 3541, **metal cutting machines**; and 3542, **metal forming machines**. The major types of machines:

METAL CUTTING MACHINES

Boring Machines: used to enlarge, shape and/or finish a hole such as that made by a drilling machine (see below). Boring machines use a rotating cutting tool to cut a stationary workpiece.

Broaching Machines: using a long, toothed cutter to progressively form and finish a hole, slot, groove or contour in a single pass, as the cutter (or broach) is pulled or pushed in a straight line relative to the workpiece.

Drilling Machines: designed to make a hole in a workpiece by advancing a rotating tool, called a drill bit, into the stationary workpiece.

Electrical Discharge Machines (EDM): designed to remove metal by means of electrical discharge spark erosion.

Gear Cutting Machines: a specially designed milling machine used to form gear teeth on a cylindrically shaped gear blank.

Grinding Machines: used to remove materials from the workpiece with a grinding wheel.

Lathes: designed to remove metal by moving a cutting tool against a rotating workpiece. The axis of workpiece rotation may be either parallel to the floor as is in the case for a horizontal lathe, or perpendicular to the floor as in a vertical lathe.

Turning Center: a numerically controlled lathe with the capability to hold a number of tools. Some turning centers can perform limited milling, drilling, and boring operations.

Machining Centers: multi–function machines, typically combining boring–drilling–milling tasks. Machining centers have three or more axes of motion, have a contouring type numerical control and an automatic tool changer.

Milling Machines: designed to remove material using a rotating cutter which is also moved laterally with respect to the workpiece.

Station–Type Machines: provide several work processing locations (stations) in a single machine. The processes provided may include drilling, boring, milling, and finishing. Material handling capabilities are built–in to transport the workpiece from one work station to another. A transfer line is a type of station machine.

Tapping and Threading Machines: cut a "thread" into a hole by shaping its sides so that a matching piece (e.g., a screw) will fit. A tapping machine is similar to a drilling machine and many drilling machines have tapping capabilities. Threading machines are designed to take a turned workpiece and cut grooves into its sides (thus threading it in such a manner that it could fit into a tapped piece). A threading machine is similar to a lathe and most lathes have threading capabilities.

METAL FORMING MACHINES

Forging Machines: used to deform the workpiece into the desired shape by means of a single or repeated blows.

Die–Forming Machines: metal forming machines employing a pair of mating dies which, when forced against the interposed sheet of material, imparts their contour on the otherwise flat sheet.

Bending Machines: designed to strain (bend) material which is usually in the form of bars or tubes.

Presses: machines having a stationary bed and a slide (ram) which has a controlled reciprocating motion toward and away from the bed surface and perpendicular to it. They are used to form and/or shear the workpiece (usually from flat sheet).

Shearing Machines: designed for straight–line cutting, involving the action of two opposing blades, one or both of which move during the shearing operation.

Punch Presses: cuts holes in stock. In general, any machine used to produce die–cut holes, regardless of shape.

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The Economic Handbook of The Machine Tool Industry

MTBA

990AG2.5

GROSS NEW ORDERS, CANCELLATIONS, AND NET NEW ORDERS 1970 TO DATE

(millions of dollars)

	TOTAL MACHINE TOOLS			METAL CUTTING			METAL FORMING		
Year	Gross New Orders	Cancellations	Net New Orders	Gross New Orders	Cancellations	Net New Orders	Gross New Orders	Cancellations	Net New Orders
1970	$1,060	$ 148	$ 912	$ 757	$ 106	$ 651	$ 303	$ 42	$ 261
1971	933	72	861	655	46	609	278	25	252
1972	1,465	53	1,412	1,051	42	1,009	414	11	403
1973	2,773	160	2,613	1,958	132	1,825	815	28	787
1974	2,970	387	2,583	2,283	266	2,017	687	121	566
1975	1,651	374	1,277	1,198	282	916	453	92	361
1976	2,370	167	2,203	1,793	131	1,662	578	37	541
1977	3,153	158	2,995	2,329	127	2,202	824	31	793
1978	4,573	224	4,349	3,559	184	3,375	1,013	40	973
1979	6,063	442	5,621	4,873	378	4,495	1,190	64	1,126
1980	5,381	627	4,754	4,436	551	3,885	946	76	870
1981	3,585	640	2,945	2,799	571	2,228	786	69	717
1982	1,934	437	1,498	1,467	402	1,064	468	34	433
1983	1,890	194	1,696	1,328	177	1,152	561	17	545
1984	3,044	128	2,916	2,005	90	1,916	1,038	38	1,000
1985	2,716	188	2,528	1,983	130	1,853	733	58	675
1986	2,322	197	2,125	1,675	131	1,544	647	66	581
1987	2,253	134	2,119	1,533	82	1,451	719	52	667
1988	3,722	131	3,591	2,795	87	2,708	927	44	883
1989	2,987	179	2,808	2,119	143	1,976	867	36	832

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GROSS NEW ORDERS, CANCELLATIONS, AND NET NEW ORDERS 1970 TO DATE

Metal Cutting Machine Tools

(millions of dollars)

Year	METAL CUTTING			DOMESTIC			FOREIGN		
	Gross New Orders	Cancellations	Net New Orders	Gross New Orders	Cancellations	Net New Orders	Gross New Orders	Cancellations	Net New Orders
1970	$ 757	$ 106	$ 651	$ 605	$ 99	$ 506	$ 152	$ 7	$ 145
1971	655	46	609	565	41	524	90	5	85
1972	1,051	42	1,009	916	39	877	135	3	132
1973	1,953	132	1,825	1,675	124	1,550	283	8	275
1974	2,283	266	2,017	1,959	243	1,716	324	23	301
1975	1,198	282	916	1,027	247	780	171	35	136
1976	1,793	131	1,662	1,594	117	1,477	199	14	185
1977	2,329	127	2,202	2,095	114	1,981	234	13	221
1978	3,559	184	3,375	3,203	160	3,043	356	24	332
1979	4,873	378	4,495	4,202	337	3,866	671	42	629
1980	4,436	551	3,885	3,986	490	3,496	450	61	389
1981	2,799	571	2,228	2,476	530	1,946	323	41	282
1982	1,467	402	1,064	1,262	373	890	204	30	175
1983	1,328	177	1,152	1,236	167	1,069	92	10	82
1984	2,005	90	1,916	1,780	80	1,700	226	9	216
1985	1,983	130	1,853	1,769	117	1,652	213	13	201
1986	1,675	131	1,544	1,499	122	1,377	176	9	168
1987	1,533	82	1,451	1,366	71	1,294	167	10	157
1988	2,795	87	2,708	2,392	76	2,316	403	11	392
1989	2,119	143	1,976	1,838	115	1,723	282	28	254

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GROSS NEW ORDERS, CANCELLATIONS, AND NET NEW ORDERS 1970 TO DATE

Metal Forming Machine Tools

(millions of dollars)

	METAL FORMING			DOMESTIC			FOREIGN		
Year	Gross New Orders	Cancellations	Net New Orders	Gross New Orders	Cancellations	Net New Orders	Gross New Orders	Cancellations	Net New Orders
1970	$ 303	$ 42	$ 261	$ 265	$ 38	$ 227	$ 38	$ 4	$ 34
1971	278	25	252	244	21	223	34	4	29
1972	414	11	403	378	10	368	36	1	35
1973	815	28	787	742	25	717	73	3	70
1974	687	121	566	583	113	470	105	8	96
1975	453	92	361	364	81	284	89	12	77
1976	578	37	541	513	28	485	64	8	56
1977	824	31	793	757	29	729	67	2	64
1978	1,013	40	973	938	37	901	75	3	72
1979	1,190	64	1,126	1,048	57	991	142	7	136
1980	946	76	870	814	70	744	132	6	126
1981	786	69	717	680	63	617	106	6	100
1982	468	34	433	399	28	372	68	7	62
1983	561	17	545	503	14	489	58	2	56
1984	1,038	38	1,000	967	36	932	71	3	69
1985	733	58	675	664	54	610	69	4	65
1986	647	66	581	567	60	507	81	7	74
1987	719	52	667	583	47	536	136	5	131
1988	927	44	883	788	39	749	138	5	134
1989	867	36	832	744	25	719	124	11	113

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